FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

First Aeronautical Weekly in the World. Founded January, 1909

Founder and Editor : STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 1033. (No. 41. Vol. XX.) OCTOBER 11, 1928 [Weekly, Price 6d. Post free, 7d.

Flight

The Aircraft Engineer and Airships

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C.2
Telephone: Holborn 3211. Telegrams: Truditur, Westcent, London.

Annual Subscription Rates, Post Free.
United Kingdom .. 30s. 4d. Abroad .. .. 33s. 0d.*
* *Foreign subscriptions must be remitted in British currency.*

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1928

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Oct. 24.... Aero Golfing Soc.—"Cellon" Challenge Cup
Nov. 1 .... Lecture, "Testing of Adhesives for Timber," by W. D. Douglas, before R.Ae.S.
Nov. 8.... Lecture, "Machinery Installation of R.101," by Wing-Com. T. R. Cave-Browne-Cave, before R.Ae.S.
Nov. 15.... Lecture, "Aeroplane Engines in Flight," by R. J. Penn, before R.Ae.S.
Nov. 22.... Lecture, "Weight of Aircraft," by Maj. T. M. Barlow, before R.Ae.S.
Nov. 29.... Lecture, "Production Problems," by F. Sigrist, before R.Ae.S.

EDITORIAL COMMENT

THE first impression one receives after a tour of inspection of the International Aero Exhibition (I.L.A.) in Berlin is that this is the greatest aero show ever held in Europe. What causes that impression is a little difficult to decide, as a count of the complete aircraft exhibited reveals the somewhat astonishing fact that actually the number is no greater than one has seen at many Paris shows, and smaller than some of the Paris Salons held since the war. The much greater variety of machines, in spite of their general civilian character, and the fact that the aircraft are housed in two separate halls, one containing the German aircraft and the other the foreign, probably accounts in part for the impression of great numbers. The stands are not nearly as crowded as one is accustomed to see in the Grand Palais in Paris, and the exhibits other than aircraft are extremely numerous and varied. Certainly, in spite of the drop from some 150 aircraft, which rumour had it would be on view, to a little more than one-third of that figure, the I.L.A. is an extremely interesting exhibition, and it is fortunate for Great Britain that so many firms decided to show machines and engines.

Berlin

The British section does not compare in size with some of the other foreign countries, but this is due to smaller stand space rather than to the actual number of machines. Most of the other foreign nations exhibit five aircraft each, and Great Britain four, so that we are by no means hopelessly outclassed in numbers except compared with Germany, which has no less than about 30 machines of various types in the exhibition. The majority of the British stands, although somewhat small, are fairly well placed, with the exception of the Bristol and Imperial Airways stands, which are most unfortunately situated. The Bristol stand is in a corner by one of the exits to Hall III and IV, and Imperial Airways have a full-size representation of an "Argosy" fuselage placed facing this exit. Both stands, moreover, are separated from the rest of the British section, and from the main hall, by very high partitions which effectively shut them off from view.

In the case of the Bristol stand, the exceptionally fine quality of the exhibited engines helps to make up for the poor location of the stand, but Imperial Airways have no such advantage, as the fuselage "mock-up" and the models, booklets and statistics, &c., exhibited on a small stand in the actual British section form a totally unworthy representation of a great company—a national company one might term it—like Imperial Airways, Ltd. Compared with the stands of German and foreign firms of the same nature, the Imperial Airways show is totally inadequate, and had better been omitted altogether.

Contrary to expectations, the organisation of the exhibition has been very disappointing. One has become so accustomed to taking German efficiency for granted that to find, as did all the British exhibitors, that nothing was ready upon their arrival was not only surprising but very disappointing. Stands were unprepared, the materials wherewith to build the necessary small structures were not available, the firm recommended by the exhibition authorities was unable to cope with the work, and, to crown everything, the workmen went on strike on the day before the opening. As a result, all was confusion and the cost of preparing stands proved vastly greater than it should have been. In the case of some of the foreign exhibitors this possibly did not matter a great deal, as most of them are subsidised by their governments, but to British exhibitors, who were relying entirely on their own resources and did not receive any government assistance whatever, it was annoying to say the least.

It was not only the stands themselves which were unfinished, but the exhibition halls themselves. On the morning of the official opening not a single banner with the name of the nation exhibiting on that section had been hoisted into place, but were lying, some of them unfinished, on the floors of the stands, in the gangways, &c. The halls are both devoid of any attempt at decoration, and exhibitors suit their own tastes in the matter of stands. Consequently one misses that uniformity which characterises all the French aero shows. Apart from these minor grumbles, it must be confessed that the Berlin Show is an excellent one.

The variety of aircraft exhibited is little short of amazing. One sees machines which are little more than "motor-assisted gliders" rubbing wing tips, so to speak, with commercial aircraft of 2,000 h.p. or more. The light 'plane type is well represented, as is also the large commercial aeroplane, but the majority of commercial, as distinct from merely civilian machines, belong to the intermediate class sometimes referred to as the "feeder-line" type. This is a class of machine which we in England have not attempted to develop to any great extent, and with the exception of the D.H.50 we have produced little along these lines. The type is undoubtedly growing in popularity, and appears worth cultivating, at least for sale abroad and in the Dominions if not at home.

Of large commercial machines Great Britain has none at the Berlin Show, but in the light 'plane class we have seen nothing at I.L.A. which threatens to outdistance our "Moths," "Avians" and "Bluebirds," which somehow look—at least to English eyes—very much prettier and at the same time quite as practical and serviceable as anything produced by other nations.

The flying boat class is represented but poorly at Berlin, there being but one Rohrbach and one Dornier in the German section, and a single small Italian flying boat in the foreign section. It is very much to be regretted that Great Britain was not able to show some of our modern flying boats such as the Shorts, Supermarines and Blackburns, which would have compared well with the examples of non-British boats exhibited. We have long held the view that in this particular branch England leads the world, and we have seen nothing at Berlin to cause us to change that opinion.

The necessity for retaining in the Berlin Show a strictly "civilian" atmosphere has led to some curious anomalies, such as machines which are obviously two-seater fighters, with a swelling of the rear cockpit ready for the Scarff gun ring, but mildly and not at all convincingly "disguised" by having large windscreens placed ahead of the cockpit.

The German section is impressive, as was to be expected, but is entirely dominated by the three large firms, Junkers, Dornier and Rohrbach, and Hall I gives one the impression that the rest of the German aircraft industry is merely allowed to exist by these firms because they build small types of aircraft with which "the big three" do not want to be bothered. One may be wrong in this, but that is undoubtedly the impression one receives. Junkers in particular seems to "overawe" the section by having taken the whole end of Hall I and erecting partitions so high as to shut him off from the rest of the German section. His next-door neighbour is Rohrbach, whose giant three-engined flying boat is large enough not to be dwindled by the high walls. Next to that is a Dornier "Super-Wal," the "Blauwal," with four Napier "Lion" engines, which also is large enough to maintain its dignity in the shadow of Junkers, so to speak, but after that the German section suddenly becomes devoted to "small fry," the largest machines apart from the three firms already mentioned being those of the Focke-Wulf firm.

Soviet Russia is very well represented with a series of aircraft of widely differing type, and the Russians appear to have assimilated much of the best practice from Western Europe and to have incorporated it in original designs. Metal construction predominates on the Russian stands, and the manner of using metal, as well as the workmanship, is better than one would have expected.

The French, Italian and Czech sections have little that is new to show, but there are no "freaks" to be found on their stands, and this in itself may presumably be taken as a form of progress.

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The Singapore Base

THE Admiralty announce that they have now accepted the tender of Messrs. Sir John Jackson, Limited, of 53, Victoria Street, Westminster, for the construction of the new dockyard at Singapore, the contract time for completion being seven years.

Bristol "Bulldog" as Service Fighter

THE Bristol "Bulldog" has been selected as a Service Fighter by the Royal Air Force. Sufficient numbers are being ordered to equip one squadron first. This is in accordance with Air Ministry practice, and no doubt other squadrons will be similarly equipped. At present it is not possible to publish the number of the squadron thus favoured.

French Air Ministry

M. EYNAC, the new French Air Minister, has been given full powers to organise the French air units, and naval, military, and civil aviation will come under his control.

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THE BERLIN INTERNATIONAL AERO SHOW

OWING to the necessity of going to press at the usual time with this week's issue of FLIGHT, it is not possible to do more than give in the present issue a very brief résumé of the aircraft exhibited at the Berlin Aero Show. The British exhibits are dealt with at some length in a special section (see pages 869 and 890), and it is not, therefore, necessary to refer to them here, other than to mention that, generally speaking, the British stands, although small, do not show up at all badly compared with the various other foreign sections of the exhibition. The Bristol and Imperial Airways stands are very badly placed, in one end of Hall I, under the gallery, and separated from the main hall by tall partitions; but the remaining British stands are as good as could be expected. Apart from the aircraft stands, the combined exhibits of the Royal Aeronautical Society and the Air Ministry are worthy of every praise. Historical in character, the evolution of British aircraft is traced in models and pictures, and the Air Ministry models are shown very effectively, suspended by thin wires against a background of blue and illuminated by concealed lights, the long row of models looking most realistic.

The I.L.A. is housed in no less than four separate halls, of which Hall I contains the German aircraft and engines, Hall II the foreign exhibits, and Halls III and IV various equipment such as aerodrome lights, wireless equipment, etc. Hall I has no gallery, but the balcony of Hall II contains a vastly interesting collection of historical material, photogrammetrical and cartographical instruments, etc., and is well worth a visit. It is in this balcony, occupying the middle portion of one side, that the Royal Aeronautical Society exhibits are displayed. Suspended from the roof close to the gallery in one end of Hall II are three old-timers in the form of an early Wright biplane skeleton, a tiny Grade monoplane of the 1914 vintage, and one of the once-famous Rumpler Tauben. These three machines may be said to form the only decoration of the Hall. Apart from them, everything is strictly utilitarian and very, very bare!

In the following brief notes dealing with the aircraft (other than British) exhibited, it is proposed to group the machines under the different nationalities, but it should be remembered that quite a number of countries are exhibiting material other than aircraft and engines, so that the Berlin Show is indeed of a very international character.

GERMANY

About 30 aircraft of different types represent Germany's contribution to the I.L.A. show, and fill Hall I comfortably but without crowding. The hall is dominated by the Junkers, Rohrbach and Dornier stands, but many of the smaller machines are at least as interesting in their own way as the three giants which fill one end of the hall. Below we give a list of the machines shown in the German section, arranged alphabetically as regards the titles of the firms.

Albatros.—Three machines are exhibited by this old-established German firm. Owing to the necessity of writing these notes before the official opening of the Show, and the absence of type indications on the machines, we cannot here give their official designations, but one is the twin-engined machine previously illustrated and described in FLIGHT, fitted with seats which can be tilted to form bunks for short

THE "FOREIGNERS": A view of Hall II, showing the British section (in foreground) and, in mid air, a 1914 Grade monoplane and a Rumpler Taube.

night flights. The power plants of this machine are Siemens-built Bristol "Jupiters." The machine bears the letters LUFT HANSA on its sides and is, presumably, destined for use by that company after the Show.

The second machine is identical with that shown recently in Paris, when we illustrated it in our pages. It is a two-seater training machine with water-cooled engine, and is exhibited

The Berlin Aero Show: General view of Hall I, in the foreground are the Heinkel machines, on the right the Folke-Wulf, and on the left the B.F.W.

stripped on the port side to show the construction, which is wood as regards the wings and steel tube for the fuselage.

The third machine on this stand is a little two-seater light school biplane of orthodox design, and fitted with a Siemens-Halske S.H.12 radial air-cooled engine.

Arado.—Exhibit the two-seater biplane which was shown at Paris, and a new high-wing cabin monoplane for commercial work. The latter is fitted with a Pratt and Whitney "Wasp" engine. The pilot's cockpit is enclosed and is placed ahead of the wing.

Bäumer Aero.—Show two small machines, of which one is the low-wing cantilever monoplane "Sausewind" which took part in the *Rundflug* in 1925. This machine is fitted with a three-cylinder Y-type Lawrance engine. The second Bäumer machine is a small two-seater biplane, evidently intended for school work, and fitted with a Siemens-Halske S.H.10 engine.

Bayerische Flugzeugwerke.—This firm, formed upon the demise of the Udet company, shows a number of interesting machines ranging from a large all-metal commercial monoplane to a little 20 h.p. light 'plane. The chief designer of this firm is now Herr Messerschmitt, whose light 'planes have been familiar to our readers for several years, and who has made good use of the Bristol "Cherub" engines, of which, by the way, he is a great admirer.

engines are totally enclosed, if indeed the engine nacelles are not empty, but rumour has it that they contain Napier "Lions." The machine has been christened "Blauwal," and is believed to be intended for service in the Luft Hansa next year.

Espenlaub.—First becoming known in the aviation world through his construction of gliders bearing his name, Herr Espenlaub is represented at the exhibition by a small parasol monoplane in which the wing is supported on four struts without bracing, the wing being secured to the struts by quick-release devices. The engine is a 40 h.p. 6-cyl. Anzani.

Heinkel.—Dr. Ernst Heinkel exhibits two types of machine at Berlin, of which one is a H.E. 10 low-wing monoplane on floats, and the other a biplane, type H.D.22, land machine. The seaplane has a fuselage of fairly normal proportions, but to it has been added a sort of coach roof enclosing the crew. This machine was designed for long-distance transoceanic flights, and was among the aspirants to the Atlantic crossing. The land machine is of more usual design, and is intended for school work, aerobatics, etc. We hope to give a more detailed description of the machines in a subsequent issue.

Focke-Wulf.—Three machines are exhibited by this firm, of which two are commercial monoplanes, while the third is a twin-engined monoplane of relatively low power.

The type A.17, a "Möwe," is a passenger machine intended

The Berlin Aero Show: Another view of Hall II, with the Russian section in the foreground.

Taking the B.F.W. machines in order of size, the commercial monoplane is a large all-metal cabin machine, type M.20, fitted with the B.M.W. 500 h.p. type 6A engine. The machine has an unusual form of wing construction in that there is but a single spar which, in conjunction with the metal leading edge, forms a D-section tube capable of resisting torsion as well as bending. The M.20 carries 10 passengers in an extremely comfortable cabin, and provision is made for two pilots to sit side by side in front, each having a set of controls. For an empty weight of 2,400 kgs. the machine carries a load of 2,100 kgs.

The "small brother" of the M.20 is a cabin monoplane of intermediate size, pure cantilever, and with the belly of its fuselage almost touching the ground. It carries pilot in front of the wing, and four passengers inside. The engine is an S.H.12.

Of the remaining machines one is a small school biplane with folding wings and an S.H.11 engine, and the other a low-wing monoplane with 20 h.p. Mercedes engine. This machine is very similar in general appearance to the Klemm-Daimler.

Dornier Metallbauten.—On the day before the opening of the show, the large stand taken by the Dornier firm was all but empty, but during the night the hull of the large "Super-Wal" was brought in, and by the time the exhibition was open the machine was (more or less) erected. The machine is of the well-known four-engined type of flying-boat. The for the Luft Hansa, and is of normal Focke-Wulf lines. The engine is a Siemens-built Bristol "Jupiter." It is a very large machine, with the telescopic legs of the undercarriage running to the wing.

Of somewhat similar general design is the A.20 a "Habicht," but this is a much smaller machine, and is fitted with a Wright "Whirlwind" engine.

The third machine, type G.L.22, is, as already stated, a twin-engined monoplane, and is described as a school and practice machine in the service of the German commercial pilots' school, Berlin. The engines are Siemens-Halskes, type S.H.12.

Junkers.—In addition to a large exhibit of parts showing series construction, there are three complete aircraft on the Junkers stand. In the centre is one of the large three-engined machines, and on one side is the famous "Bremen," which flew from Ireland to Newfoundland. On the other is one of the single-engined low-wing types similar to the original "Annelise," which is stated to have been in service since July 18, 1919. It does not look it!

Leichtflugzeugbau Klemm.—Two machines are shown. One of these is of the L.25 type with 20 h.p. Mercedes engine, but now incorporates plywood-covered fuselage. The other is similar, type L.25 W, but fitted with floats. This is shown without engine. It will be remembered that it was on a type L.25 that Herr Lusser recently won the French International

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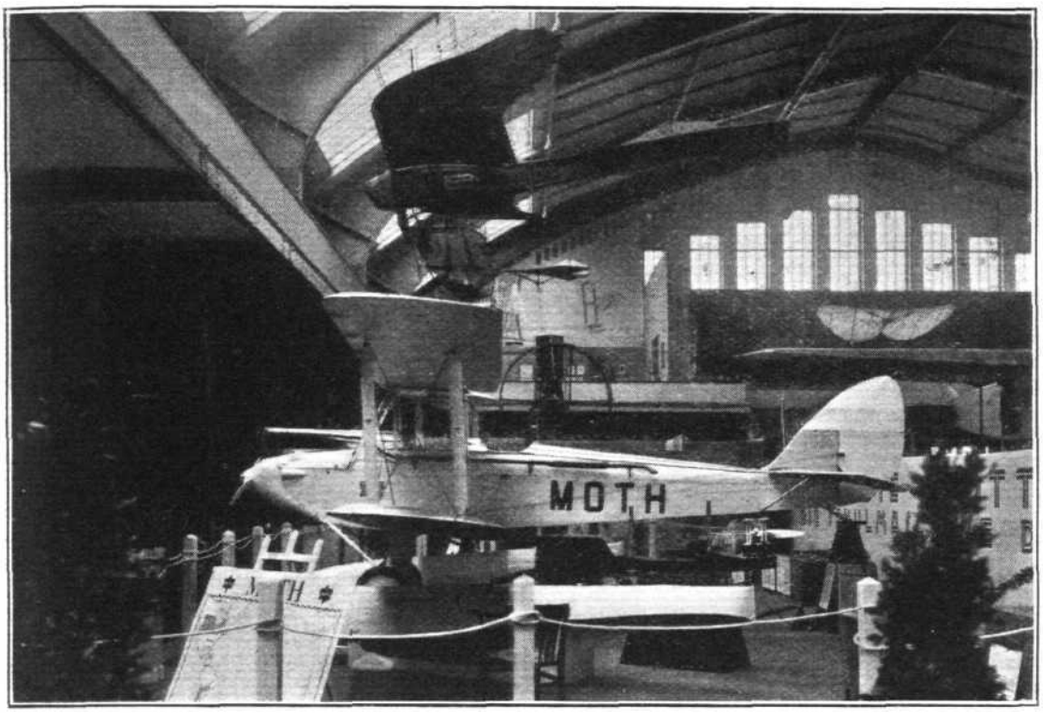


The "Moth" and the "Dove": The D.H. "Gipsy Moth," and above it the early Rumpler Taube (Dove).

Light 'Plane Competition at Orly. His machine, however, was fitted with a 40 h.p. Salmson engine.

Gebrüder Müller.—This firm, of which we do not remember having heard previously, exhibits a very small light 'plane in the form of a parasol monoplane two-seater with "Y" type Anzani engine. A stout fuselage member runs through the "roof" of the fuselage, over the top of the two cockpits, and to this member the wing is attached. It is braced on each side by but a single strut, so that one assumes single-spar construction. The wing certainly does not appear to be of a section likely to have a stationary centre of pressure.

Raab-Katzenstein.—Three machines of generally similar appearance are exhibited by this firm. The "Schwalbe," with S.H. 12 engine, is a two-seater school machine. The "Pelikan" is somewhat similar to Fieseler's machine, and is shown partly stripped, while the little "Grasmücke" with three-cylindered "Y" Anzani is a single-seater used for advertising by a chocolate-manufacturing firm.

Rohrbach.—On the very large stand taken by this German constructor is but a single machine, but this is a three-engined flying-boat of the "Romar" type. The machine is of typical Rohrbach design and has a boat hull of very narrow beam in proportion to its depth. Side floats provide the lateral stability which the hull itself lacks. The engines, mounted on "stilts" high above the wing, drive pusher airscrews. Around the sides of the stand are a number of models, statistics, graphs, illustrations of wind channel and tank experiments, etc., and altogether Dr. Rohrbach has a most interesting exhibition of his own. Specimens of wing construction, etc., are also shown.

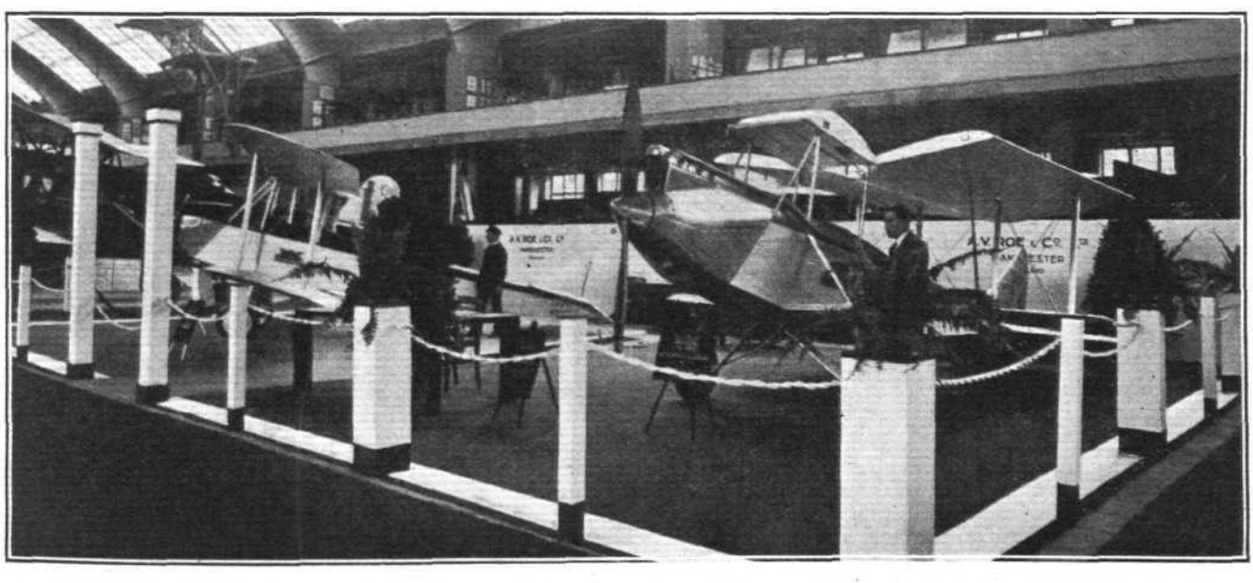
CZECHOSLOVAKIA

A very favourable situation in Hall II has been obtained by the Czech firms, of which three are showing aircraft and Walter a very fine series of engines.

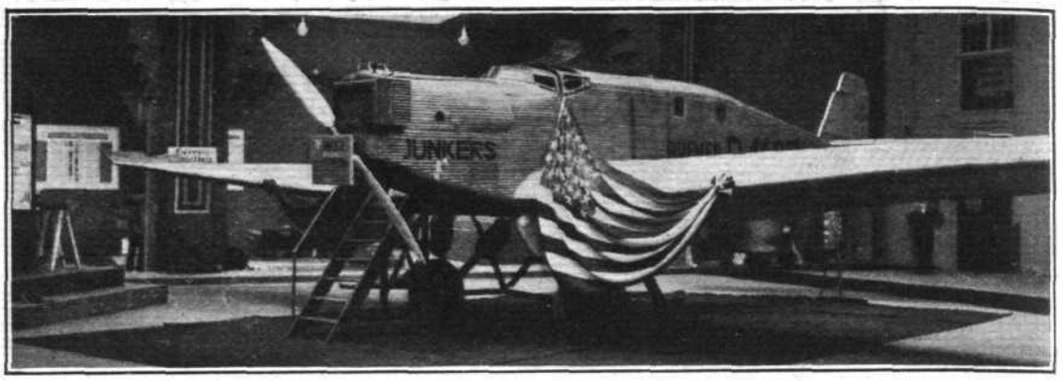
Aero.—This firm is represented by, as far as can be seen, the same machine which was shown in Paris in the summer. This is the type A.23 cabin biplane used by the Czech State air lines, and is fitted with a Walter-built Bristol "Jupiter" engine.

Avia.—Two machines are exhibited by the Avia firm, of which one is the well-known B.H.11 low-wing light monoplane with Walter engine. The other is a two-seater school biplane, also with Walter engine, and is presumably intended as an alternative type for those who do not like the monoplane type.

Vojenska Tovarna na Letadla shows two machines, both of Smolik design. The S.316 is a two-seater which looks like a reconnaissance biplane, but which is probably regarded, for the purpose of the exhibition, as a school machine. The S.18, Walter engine, is a small school biplane.



THE AVRO EXHIBIT: The two "Avians," that on the left being fitted with an Armstrong Siddeley "Genet II," the other having an A.D.C. "Cirrus II."



An Historic Exhibit: The Junkers W33 "Bremen," which made the first east to west Atlantic flight.

FRANCE

France is represented by five aeroplanes, of which, however, four were exhibited at Paris, and are therefore already known to our readers.

Bleriot.—This famous French firm exhibits an entirely new type, the B.111, which is a low-wing passenger monoplane of plywood construction. The engine is a water-cooled, with nose radiator. The undercarriage is unusual in that each wheel is supported on a sort of " wish-bone " arrangement of struts from the wing roots. We hope to give a detailed description of this machine next week.

Henry Potez is represented by the Potez 32 monoplane shown at the Paris Show, and which has now received the registration letters F-AITZ. The engine is a Salmson radial air-cooled.

ITALY

Italy's contribution to the Berlin show consists in five aircraft, a number of engines, and some models and photographs.

Aeronautica d'Italia S.A. exhibit a Fiat A.120 two-seater, which is obviously a two-seater fighter but has been disguised

A German Air Yacht: The large Rohrbach "Romar" flying boat of Luft Hansa. It is fitted with three B.M.W. engines of 800 h.p.

Breguet is represented by the famous " Nungesser-Coli " machine shown at Paris. This is the machine which carried out so many long-distance flights, and is a real battle-scarred warrior.

Farman.—The pioneer brothers are represented at Berlin by the large fuselage with wing stumps which was shown at Paris, and in which the engines are mounted in tandem high above the fuselage, and by the small cabin monoplane with " Titan " engine, also shown in Paris.

Nieuport-Delage show a small cabin monoplane with cantilever wings and a Wright " Whirlwind " engine. The pilot is enclosed, and the cabin seats four passengers.

by a windscreen in front of the rear cockpit. The swelling of the cockpit coaming, however, renders this disguise rather futile.

Macchi.—This firm shows the M.52, holder of the world's speed record.

Breda.—Like the machine previously mentioned, the Breda type A.7 is quite obviously a military machine thinly disguised. It is a two-seater parasol monoplane.

Fiat.—At the last but one Paris Aero Show there was exhibited in skeleton a small all-metal single-seater fighter, which was, as far as is possible to see, identical with the C.R.20 exhibited at Berlin. It has a water-cooled engine,

Big and Little Brother: Two B.F.W. commercial monoplanes, a large 10-seater (the M.20) and a smaller four-seater.

One of the few seaplanes at the Berlin Show. The Heinkel H.E.10 monoplane. The Albatros stand is in the background.

and the heart-shaped nose radiator found on the machine at Paris.

Savoia.—The name Savoia has for many years been associated with flying boats, and at Berlin the firm shows a small machine of this type, the S.59 bis. Presumably the machine is intended for school work, as it does not appear to be of very high power. It shows the flat sides and hollow step which characterised Savoia machines in the days when Laurence Santoni was connected with the firm, and so is presumably not one of the latest types.

RUSSIA

Soviet Russia makes a very excellent show at Berlin, and it is quite certain that Russian prestige in the matter of aircraft production will increase as a result of this exhibition.

The firm titles and names of Russian machines are so difficult to give phonetically that we shall not attempt here to do so, but confine ourselves to brief general descriptions.

One machine is a high-wing monoplane equipped as an ambulance. The fuselage is of metal construction, while the wing appears largely made of wood.

A rather attractive machine in the form of an all-metal sesquiplane shows traces of Junkers influence in its construction, corrugated Duralumin sheet being liberally employed everywhere. The machine has a fuselage of nearly triangular section, and is a single-seater with water-cooled engine. Two Lamblin " lobster pot " radiators are mounted one on each side of the nose. There is a single seat for the pilot, so that it is assumed that the machine, which is too large for a fighter, may be intended for long-distance mail carrying.

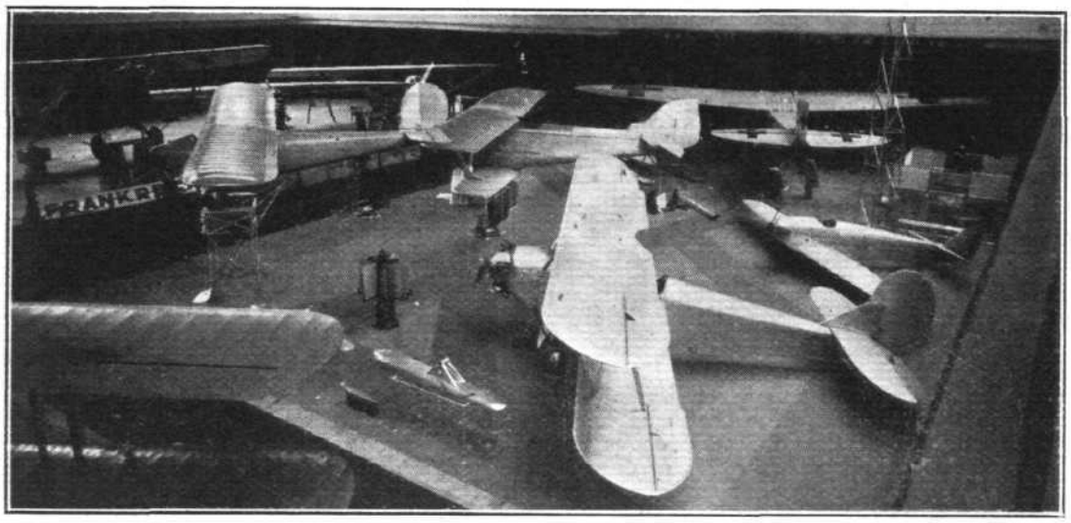
Next in size comes a small school biplane of orthodox design and construction, fitted with a 5-cylinder radial air-cooled engine.

The light 'plane class is represented on the Russian stand by two machines. One is a small low-wing monoplane with its wheels mounted on a single-spring axle, and the other is a strut-braced parasol monoplane two-seater, with its wheels mounted on cantilever struts and a streamline wire as an " axle." Both are fitted with two-cylinder flat twin air-cooled engines.

The Russian exhibit is completed by a very original form of motor-driven sledge. A Bristol " Lucifer " engine drives a pusher airscrew, and the passengers are accommodated in a small cabin. Ahead of this is the driver's seat, which is not enclosed but protected by a windscreen.

The sledge has three skis or runners, one (steerable) in front and two behind. Through the two rear skis project two tubular sprags, operated from the driver's cockpit by cables and cranks. Presumably these are intended to act as brakes by digging into the snow and ice. One can imagine quite a high speed being possible with this sledge on smooth ice or hard snow.

At the Berlin Show: The exhibit from Czecho-Slovakia.



Another "Foreigner" at Berlin: The Russian section, with a varied assortment of machines.

Altogether, the Russian section forms quite an interesting one, and demonstrates that, so far as aeronautics are concerned, the Soviet Republic intend to keep abreast with the progress of the "outside" scientific world. Under the old *régime*, Russia did not play a very big part as regards aeroplane designing—except for the work of M. Sikorsky, the father of the "giant" aeroplane, who is now carrying on his work in America—but now Russia is making a serious effort, and a not altogether unsuccessful one, to join the ranks of the foremost of European aircraft constructors and designers.

With the foregoing, together with our special section dealing with the British exhibits, the reader will, we hope, have obtained a rough idea as to the extent of the Berlin Aero Show. Next week we will continue our report of the exhibits in greater detail.

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Competition for an Aerodrome Design

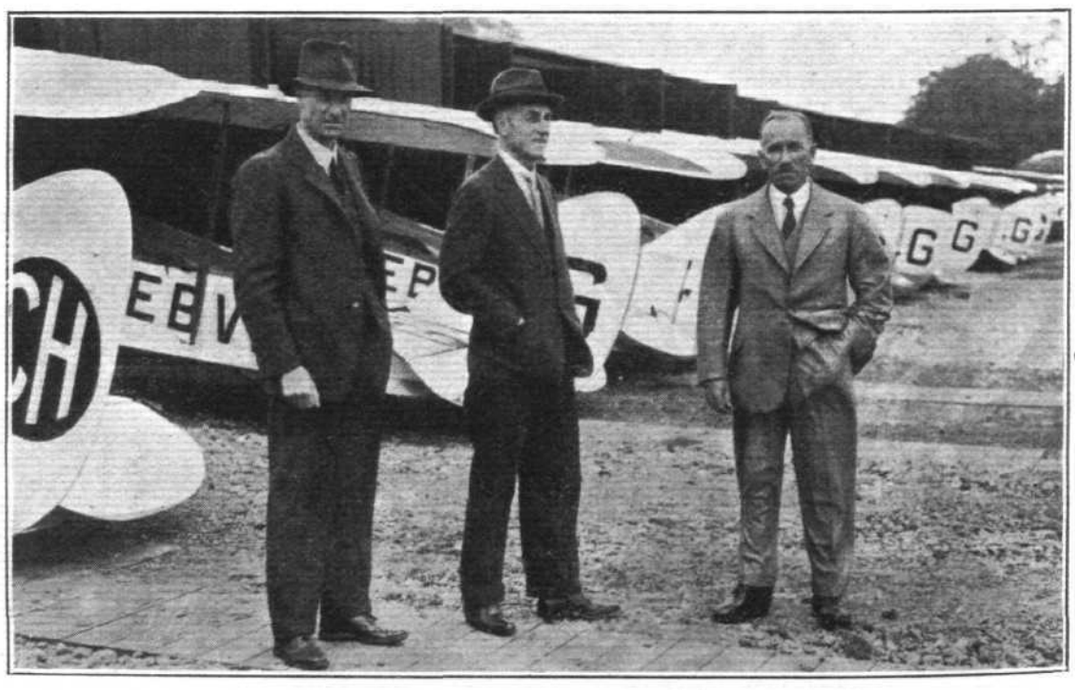
THE jury for the Royal Institute of British Architects' competition for a design for an aerodrome announce that, as the result of the preliminary stage of the competition, the following 10 competitors have been selected to take part in the final competition:—

Laurence Williams, D. H. McMorran (Bartlett School of Architecture, University of London), L. C. S. Farmer (School of Architecture, the Polytechnic, Regent Street, W.1), C. A. Minoprio (School of Architecture, University of Liverpool), F. S. Fry, N. B. Hillier (School of Architecture, the Architectural Association, London), M. Hartland Thomas (R.W.A. School of Architecture, Bristol), Miss Ruth Ellis (School of Architecture, the Architectural Association, London), W. R. B. Bertram (Glasgow School of Architecture), and F. W. Rowbotham.

The final competition, the prizes for which have been given by the directors of the Gloster Aircraft Company, Limited, and Messrs. H. H. Martyn and Co., Ltd., will consist of a design for an imaginative scheme for a London aircraft terminus suitable to the supposed requirements of air traffic 15 years hence. The general object of the competition is to stimulate the imagination of competitors and to assist them to visualise the influence which aerial development will have on the design of a first-class aerial terminus with every accommodation for personnel and machines and with every equipment and comfort for passengers.

Aircraft-Carrier for Sale

THE smallest of the aircraft-carriers in the Navy, H.M.S. *Pegasus*, has been earmarked for sale. Commenced at *Clydebank*, as the Great Eastern Railway steamer *Stockholm* she was purchased by the Government in 1917 and fitted with a flying-off platform forward and a hangar aft. The *Pegasus* was commissioned for service in the Grand Fleet Flying Squadron, and after serving in the White Sea in 1919, was employed in the Mediterranean. She was relieved on that station by the *Eagle* in 1923. Early in the following year she was recommissioned and was sent out to China, and has since been reduced to reserve status.



Sir Samuel Hoare (centre), Capt. G. de Havilland (left), and Capt. C. C. Walker, during the Air Minister's visit to the de Havilland Aircraft Co.'s works and aerodrome of Stag Lane, Edgware, on October 8. He watched the erection of a Gipsy-Moth, included a tour of the new D.H. Engine factory in his inspection, and was very impressed by the general activities of the company.

FLIGHT
AIRCRAFT ENGINEER AND AIRSHIPS

BRITISH EXHIBITS AT THE

THE MACHINES

THE BLACKBURN AEROPLANE CO., LTD.

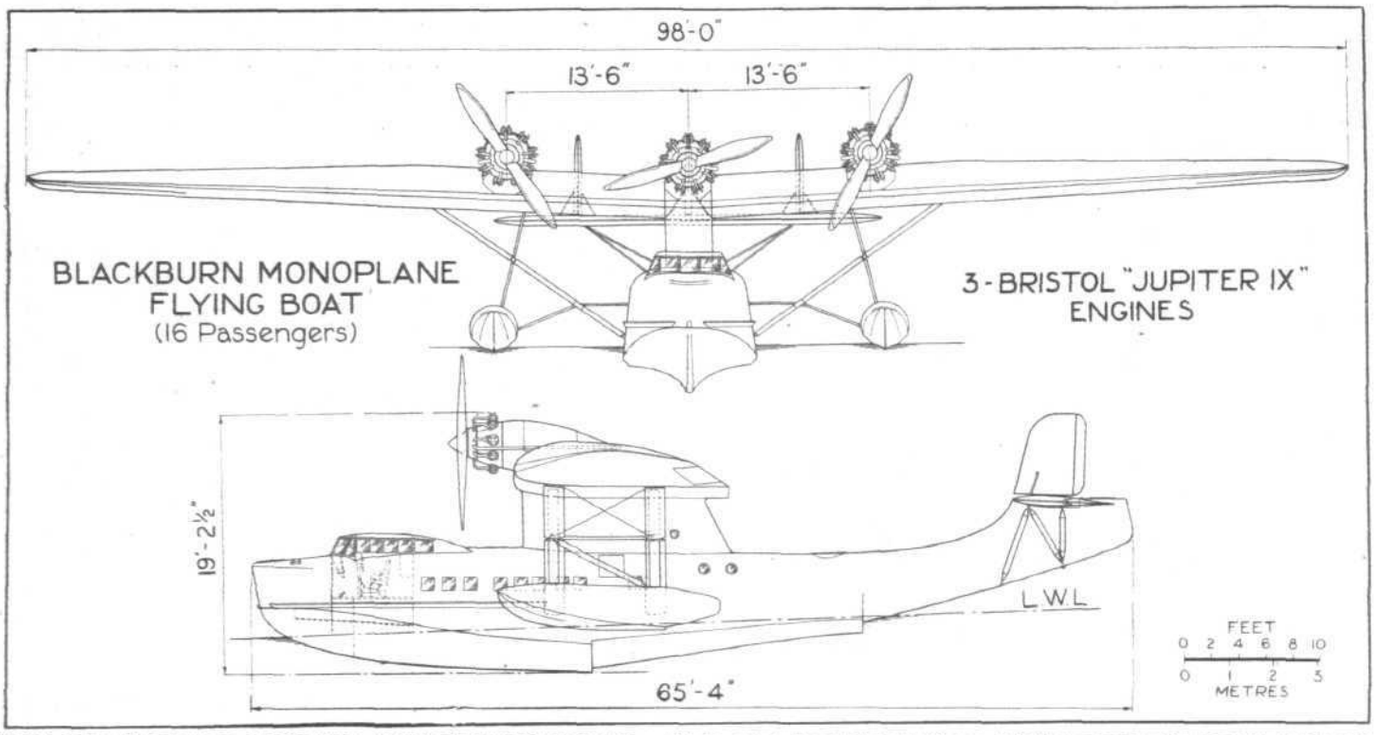
The exhibits of the Blackburn Aeroplane Co., Ltd., consist of the following: a "Bluebird III" land 'plane completely rigged; model of the "Bluebird" with interchangeable wheel and float chassis; a "Bluebird" Duralumin float; model of the "Lincock" (classed as a sporting single- or two-seater machine); model of a large 3-Jupiter monoplane flying-boat; framed photographs and drawings of the "Iris II," "Ripon II," "Lincock" and "Bluebird" land machine and seaplane; albums of photographs, specifications, brochures, etc.

The limitation of the exhibits to commercial and civil types rather cramps the Blackburn Company's style, as most of their designs up to date have been of a military nature.

The Blackburn "Bluebird III" is a modified version of the Mark II. It has the petrol tank in the top centre plane, whereas the tank in Mark II was installed inside the fuselage behind the dashboard. A larger oil tank having a capacity of 5 gallons (4 gallons of oil and 1 gallon air space) is also fitted. Further, the ailerons have been shortened to give lighter control. The wings are of normal spruce spar and built up rib construction with internal bracing of spruce drag struts and steel tie rods. External bracing consists of streamline wires. The design of the folding joints ensures that no undue stress is put upon the wings or joints when folding. Steel tubes only and streamline wires are used in stressed portions of the centre structure. The fuselage is composed of two units, which are complete in themselves and detachable from each other for repair or replacement. The engine mounting, consisting of duralumin plate box structure, is secured by four bolts to the cockpit structure and separated from the cockpit by a fireproof bulkhead. There is a normal tail plane with elevators of large area hinged at the rear spar. A special feature of the control surfaces is that the same hinge fitting is used for ailerons, elevators, and rudder. The wings can be folded in 4 mins. by one person.

The aileron and elevator controls are operated by two side-by-side control levers, either of which may be detached when dual control is not required. Two side-by-side rudder bars control the rudder, and a central control lever and quadrant, easily operated from either seat, controls the engine throttle. The run of the control cables to the control surfaces is arranged as simply and accessibly as possible. Aileron cables run from a central lever behind and below the cockpit seat to the bottom planes, the cables passing over the hinge centres in order to ensure satisfactory folding. The two ailerons on each side

THE BLACKBURN "BLUEBIRD" AT BERLIN: The "Bluebird" exhibited at the Show is a Mark III, fitted with the Armstrong Siddeley "Genet," and is similar in most respects to the Mark II shown above.



THE BLACKBURN MONOPLANE FLYING-BOAT: Side and front elevations of the proposed three-engined (Bristol "Jupiter") 16-seater commercial machine, a model of which is shown at Berlin.

are interconnected by rigid struts and the compensating cables return through the bottom planes along the same run as the operating cables. Rudder cables run externally direct from lugs on the outer extremities of the rudder bars to the rudder, and the elevator cables also run externally from levers at the ends of the control stick shaft to the elevator king levers.

Petrol feed is by gravity. There are side doors to the cockpit where pilot and passenger are seated side-by-side. The machine is fully equipped for service with the following: air speed indicator; altimeter; cross level; revolution indicator; oil pressure gauge; switches (dual ignition); petrol priming system; petrol contents gauge; fire extinguisher; tyre pump; pliers; screwdriver; movable spanner and engine tools (supplied by engine makers).

The all up weight of the land 'plane type is 1,455 lb.; wing loading 6·1 lb./sq. ft.; h.p. loading 21·3 lb./h.p.; top speed at ground level 88 m.p.h.; cruising speed 75 m.p.h.; landing speed 35 m.p.h.; endurance at cruising speed 4 hrs.; service ceiling 11,300 ft.; take-off (5 m.p.h. wind) 10 secs.; rate of climb from ground level 490 ft./min. The engine is the Armstrong-Siddeley "Genet" 65 h.p. air-cooled radial.

Wing span is 28 ft., gap 5 ft. 3 ins., chord 4 ft 9 in. Folded width 9 ft. 10 in. Overall length 26 ft. 7½in.

The Blackburn Monoplane Flying Boat, represented by a scale model, is fitted with three Bristol "Jupiter IX" engines and has passenger accommodation for sixteen. The thick monoplane wing is mounted, on a sort of conning tower, high over the long cabin-hull and well back from the nose, and the three "Jupiters" are mounted on the leading edge 13½ ft. apart. From the bottom of the keel to the top of the engines is a distance of 19 ft. 2½ in., and 16 ft. 6 in. from the low water line on the boat to the top of the engines. There can thus be little danger of spray rising to the propellers. A float is fitted on each side of the hull about 14 ft. of the centre line, and braced to the wing. The wing section rises to its thickest just beyond each side of the outer engines, then tapers to the wing tips. It is braced with sloping struts from the hull. There is a low raised top to the pilot's cabin in the nose and windows for each passenger along each side of the hull. The tail unit is highly mounted over the water line. Rudders are triplicated and narrow.

Span is 98 ft.; overall length, 65 ft. 4 in.

The Blackburn "Lincock" with the Armstrong-Siddeley "Lynx" 200 h.p. engine is exhibited in model form as a sporting machine for single- or two-seater purposes. It can be produced cheaply and is of high performance. It carries the same fuel and load of higher powered machines in the same class. Its manœuvrability is excellent. In performance it is the equal of higher-powered types in its class without supercharged engines. One of these machines, it will be remembered, took part in the last King's Cup Air Race.

THE DE HAVILLAND AIRCRAFT CO., LTD. STAND No. 49, in Hall II, has been taken by the De Havilland Aircraft Co., Ltd., who are showing one complete "Gipsy-Moth," one complete float undercarriage, and also one ski undercarriage. In addition, there is a selection of accessories for the D.H. "Moth," such as sets of D.H.-type telephones, sets of telescopic chocks, D.H. portable and garage tail trolleys, D.H. wheel jack, a set of D.H. tethering pickets, and a set of D.H. aerobatic harness. Also, there is one of the Moth metal propellers of the Fairey type. The D.H. "Gipsy" engine is a four-cylinder in line air-cooled unit, specially designed by Maj. F. B. Halford, F.R.Ae.S., in collaboration with Capt. G. de Havilland, F.R.Ae.S. This engine in production form has already proved itself; firstly, by its magnificent performance in the race for the King's Cup in 1928, in which the three "Gipsy-Moths" entered finished first, fourth and sixth, completing without incident the course of 1,100 miles at full throttle; secondly, by its recapture for Great Britain of the world's altitude record for two-seater light aeroplanes; and by its 42 hours' duration flight, all of which triumphs have been achieved during the few months which have elapsed since its introduction.

The development of the "Gipsy" engine has been unusual. The first batch of experimental engines was completed in July, 1927, and developed 135 h.p. In this "boosted" form it was used in the record-breaking "Tiger Moth," and subjected to continual severe running tests, both on the test bench and in the air. Many hundreds of hours of running have been completed, terminating in the successful passing of the official type trials in March last—the first aero engine to accomplish this severe test running on ordinary No. 1 petrol, instead of a fuel of special constitution.

The present production type "Gipsy" engine represents a "de-tuned" edition of the racing type, having a lower compression ratio and smaller valves. Its robustness and reliability are characteristics assured by this severe system of development.

This opportunity of producing a new engine for the D.H. "Moth," with all the experience of the past to go upon, has made it possible to produce accessibility, highly efficient cooling, smooth running and freedom from oil leakage; to use large bearing surfaces and to design every detail for easy and accessible adjustment. Throughout the whole lay-out of the engine and the design of every one of its components the vital factors of low first costs and upkeep have been kept prominently in mind.

It will be appreciated that the higher power of the "Gipsy" engine has a marked effect on the performance of the "Moth." As compared with the X type, the new "Gipsy Moth" is more economical on petrol and oil; it has a higher crusing speed; while its get-off and climb, as compared with the X-type

Moth, are substantially improved—a characteristic which is greatly appreciated by light aircraft users.

Being of reduced height and clean lines, the Gipsy engine is installed low in the fuselage of the Moth, and is completely cowled on unusually attractive lines. Embodied in the exhaust system is an effective silencer which relieves the fatigue experienced during a long flight caused by loud

At a small extra cost the Gipsy Moth can be fitted with the Handley Page Automatic Slot Device.

The performance at the fully-loaded weight of 1,350 lb. (613 kgs.), representing machine with pilot and passenger only, is as follows : full speed at ground level, 103-105 m.p.h. ; full speed at 5,000 ft., 100 m.p.h. ; cruising speed at 1,000 ft., 85-90 m.p.h. ; stalling speed, 40 m.p.h. ; rate of climb,

["FLIGHT" *Photograph*

THE "GIPSY MOTH" : The latest model of the de Havilland "Moth" light 'plane, fitted with new D.H. "Gipsy" engine, is the main attraction on the "D.H." Stand.

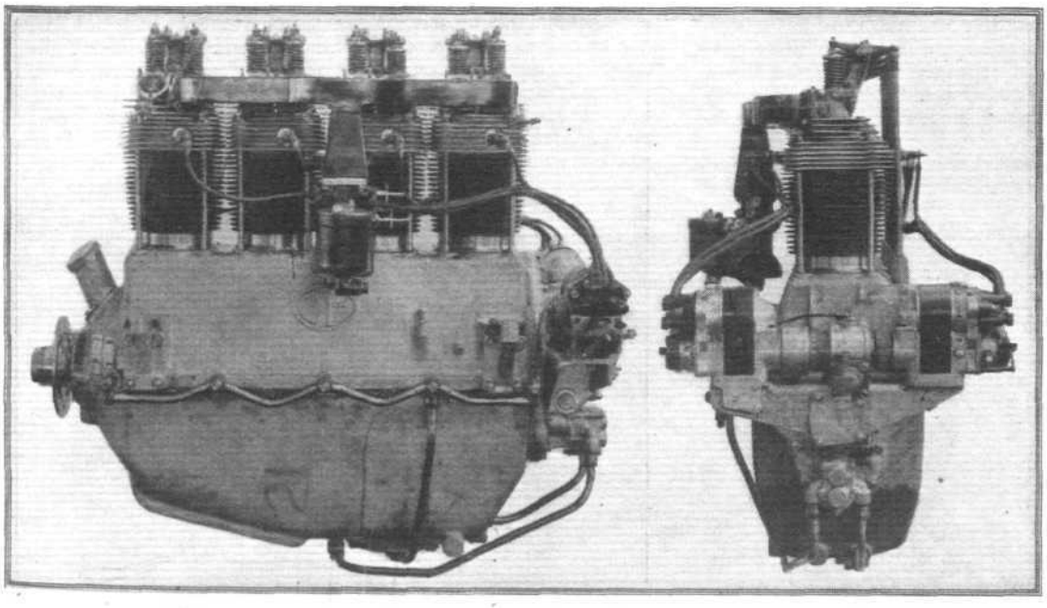
exhaust noises, while the low position of the engine has greatly improved the view forward from the cockpits.

A feature of the Gipsy Moth is a specially-designed undercarriage of wide track, embodying the divided axle principle. Possessing unusual shock-absorbing qualities, the new chassis has undergone a severe period of development on The de Havilland School of Flying.

Exhaustive tests have proved that far less skill is required

700 ft. min. at ground level ; time to 5,000 ft., 9 mins. ; time to 10,000 ft., 21 mins. ; absolute ceiling, 18,000 ft. ; take-off, 80 yards ; length of landing run, 100-120 yards. At a true speed of 80 m.p.h. (128 km. per hour) the range varies from 4½ hrs. to 5 hrs., according to height—thus giving 360 to 400 miles (580-642 km.).

As regards the " accessories," in the " Moth " Garage-Types Tail Trolley, they have a strong trolley designed for club, etc.,

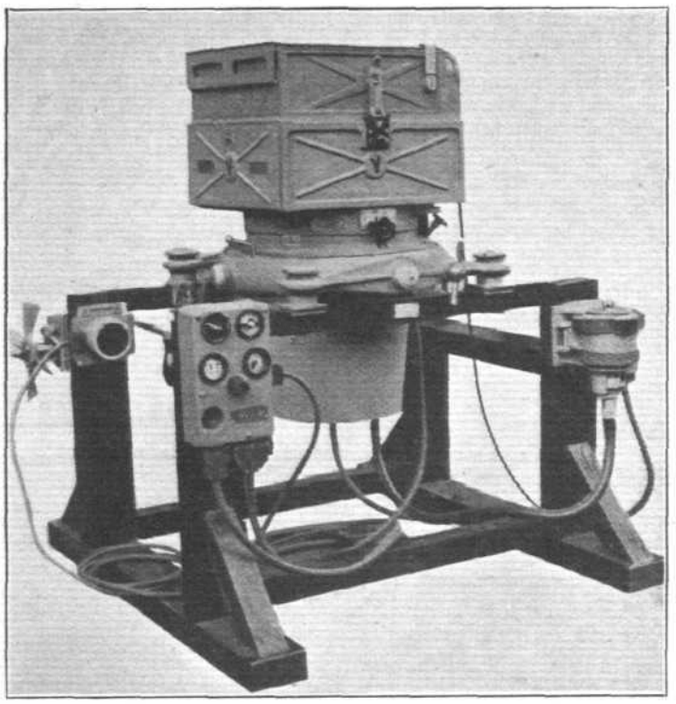


The new D.H. Engine : The new de Havilland "Gipsy" engine, which is fitted in the "Gipsy Moth" light 'plane.

to make a good landing, the effect of careless mishandling of the controls is to a great extent neutralised, and the difficulties invariably experienced by a beginner in making satisfactory landings are considerably reduced. These results are obtained by the use of new type shock-absorbing legs of long travel, which are attached to the fuselage longerons by special fittings. All wearing surfaces are of generous proportions, and are provided with grease gun lubrication.

use, where a large number of machines have to be manœuvred about at short notice, while a lighter variety is shown, which is carried in the machine itself. Another desirable accessory consists of a pair of neat and very light chocks, which are also carried on the machine.

The D.H. telephones are neat, light, and comfortable, and can be adapted to any aircraft by altering the lengths of the inter-cockpit connecting tubes. The D.H. Airspeed Indicator



AT BERLIN: The Williamson "Eagle" Aircraft Camera, produced by the Williamson Manufacturing Co., Ltd., which is exhibited on the De Havilland Aircraft Co.'s Stand.

is a very simple instrument, working against a spring on the weathervane principle. Fitted at the base of the front starboard strut, it is fully visible from both cockpits, clear of the propeller slipstream.

THE WILLIAMSON MFG. CO., LTD., WILLESDEN GREEN, LONDON, N.W.10.

THIS firm, who are pioneers in connection with photographic cameras for aircraft, are exhibiting on the de Havilland stand one of their well-known "Eagle" Automatic Electric Aircraft Cameras. Aerial photography has already become a most important branch of aviation, and there is not the slightest doubt that it has yet to play an even greater part in the near future. So far, surveying and mapping have been the main uses to which aerial photography have been put, but we venture to suggest that it has great, and we think as yet hardly appreciated, possibilities for commercial work. Advertising, Estate and Housing business, and also topographical work.

Aerial photography is, however, a specialised job, in operation as well as regards the apparatus. The Williamson Company have had many years' experience in producing cameras for aerial work, and the camera exhibited is one of their latest, and most successful, models. It is for roll films, and as its name implies, it is automatically and electrically controlled.

A. V. ROE AND CO., LTD.

THERE are two Avro "Avians" at the Exhibition, one fitted with a "Cirrus Mk. II" engine, and the other with an Armstrong-Siddeley "Genet," Mk. II engine. Both machines are standard. It is interesting to note that this type of light aeroplane is being despatched in batches of fifties every six months to A. V. Roe and Co.'s agents in America. This production type "Avian" has been strengthened a good deal so as to enable it to withstand the varied handling which it may receive from beginners in flying, and when used for school work. The lines have been improved considerably and the machine has a remarkably "clean" appearance.

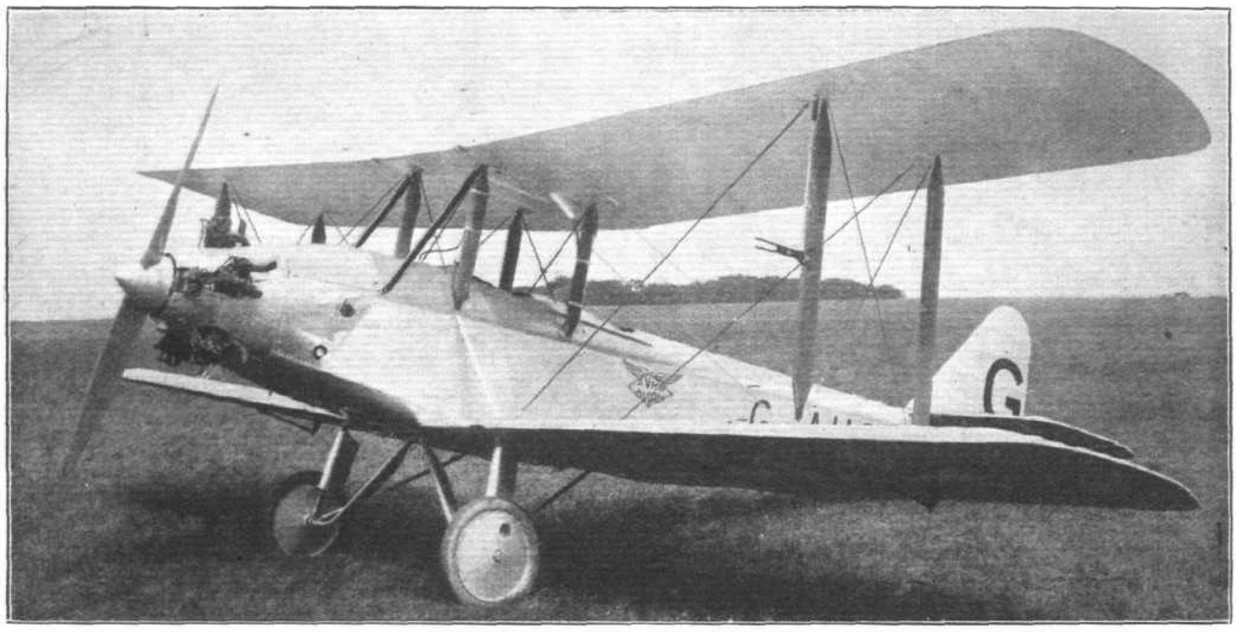
The fuselage is of the flat-sided three-ply covered type, and the form of construction adopted is simplicity itself, having the advantage over the wire-braced girder type of construction that it does not require any trueing-up after prolonged service. In front a fire-proof bulkhead separates the cockpits from the engine, which is supported on a very simple mounting of steel tubes. The engine cowling is very neat and so arranged as to be entirely detachable, thus leaving the engine exceptionally accessible, the more so as there is little or no bracing to get in the way. What adds further to the facility with which inspection and adjustment of the engine can be carried out is the special type of undercarriage, invented by "Bert" Hinkler, which lowers the machine a good deal when the wings are folded, the top hamper of the engine thus being within easy reach.

The two cockpits are arranged one behind the other in the customary manner, and dual controls are provided, so that the machine may be used for instructional purposes. The "joy stick" in the front cockpit is detachable so as not to be in the way when a non-piloting passenger is being carried.

The new undercarriage is of the "divided" type, *i.e.*, there is no axle running across from side to side. Instead, the two separate wheel axles are hinged on the centre line of the bottom of the fuselage and bent to a horizontal direction near the wheels. The shock absorbing, or telescopic member is the front "leg" of the chassis Vee, which incorporates rubber block compression rubbers. The rear chassis leg is taken to a point on the lower rear wing spar.

As regards the lower wing, two short wing roots are attached permanently to the fuselage. These roots are triangular in plan view, with the base of the triangle formed by the leading edge and the apex at the rear spar hinge. To brace the root against the undercarriage loads a short diagonal strut runs to the top longeron. When the wings are folded they swing, of course, around the hinge. The point of attachment of the rear chassis strut being situated some little distance out from the hinge, when the wings are folded the upper end of the rear strut moves back with the wing, and in so doing pulls the wheel back with it, and at the same time the wheel moves upward slightly. The combined effect is to lower the

BRITISH AIRCRAFT AT BERLIN: The Avro "Avian" light 'plane, fitted with the A.D.C. "Cirrus II" engine.



BRITISH AIRCRAFT AT BERLIN: The Avro "Avian" light 'plane, fitted with the Armstrong-Siddeley "Genet II" engine.

machine and to relieve the load on the tail skid. Thus, with the wings folded, the machine can be wheeled along quite easily by one man.

Telescopic jury struts are used to separate the inner ends of the wings when the latter are folded. When the wings are spread the jury struts are "telescoped" and rest in clips under the top plane.

The wing construction of the Avro "Avian" is of perfectly normal two-spar type. The wings are but slightly staggered in relation to each other, but the gap is large and the biplane arrangement is very efficient.

The top plane centre-section contains the petrol tank, which has a capacity of 20 gallons. An interesting feature is that one of the centre-section struts is used as the petrol gravity pipe, the flexible petrol tubing being joined to the lower end of this strut. The high position of the petrol tanks ensures an ample head of petrol even during a steep climb, and, of course, the petrol system is greatly simplified by using direct gravity feed.

When fitted with the standard "Cirrus" Mark II engine, the tare weight of the "Avian III" is 875 lbs. The normal loaded weight of the machine is 1,360 lbs., and the certificate of airworthiness covers up to a gross weight of 1,450 lbs. for "aerobatics," and up to 1,600 lbs. for ordinary straight flying. In other words, if it be desired to use the "Avian" for long-distance non-stop flights, a large tank can be fitted in the front cockpit, and the machine may be loaded up to 1,600 lbs. without exceeding its C. of A. for "non-aerobatic" flying.

The main performance figures are as follows, and apply to the loaded weight of 1,360 lbs.: top speed at ground level, 105 m.p.h. (170 km./h.). At 5,000 ft. the top speed is 100 m.p.h. The absolute ceiling is 17,000 ft. (5,180 m.), and the stalling speed 40 m.p.h.

THE ENGINES

A.B.C. MOTORS, LTD.

THE A.B.C. "Hornet" 75 h.p. air-cooled engine is exhibited on the stand of Messrs. Autoflugs in the German section. This new engine, produced by A.B.C. Motors, Ltd., of Walton-on-Thames, may be regarded as a development of the A.B.C. "Scorpion," which the company has had in production for some years, supplying considerable numbers to the Continent, especially Germany. The "Hornet" is an air-cooled "flat twin" with four cylinders. By retaining the "flat twin" arrangement, very low frontal area has resulted, whilst the mechanical balance is wonderful, although there must be an unbalanced "slewing" couple with two crank throws. There is a convincing absence of vibration. It passed through the Air Ministry type tests with honours. These were carried out in very hot weather, the temperature in the test house being 102° F. at times. On one particular day the temperature was about 100° F. with the intake temperature of 30° C., and the average petrol consumption for the whole day of the "Hornet" was 0·488 pint/h.p./hr.! The final figures from the test suggested that the engine gave promise of long periods of running without the necessity of overhaul once it was in production. It was the original engine which, after about 80 hours of development testing, was submitted for the Air Ministry's tests, and it passed at the first attempt.

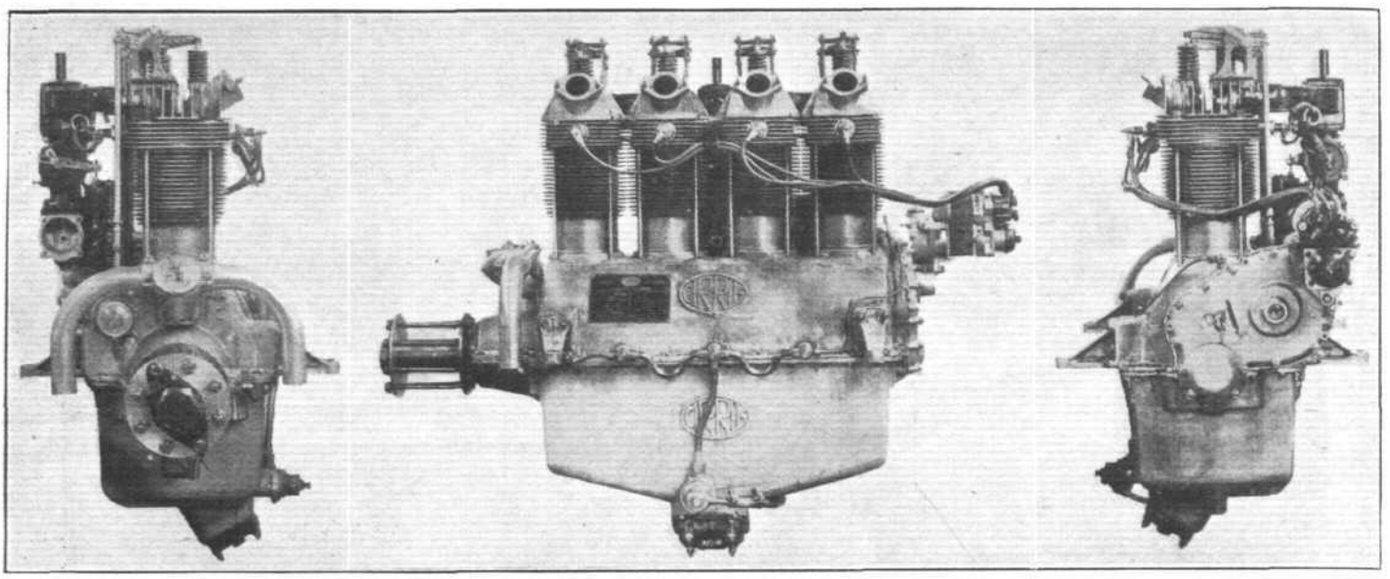
The cylinder heads, pistons, and certain other parts are identical with those in the A.B.C. "Scorpion" engine, so that those who use both types have an advantage in the smaller number of spares necessary to be stocked. There are two valves per cylinder, operated by push rods and rockers from the two camshafts on front and back of engine. As the engine has dual ignition (Watford dual-spark magneto), there are two sparking plugs per cylinder. Aluminium alloy pistons are used fitted with fully-floating gudgeon pins. The back cover of the engine houses the two oil pumps (pressure and scavenger), which are of eccentric-operated plunger type, of equal design and capacity. Provision is also made for fitting a fuel pump if desired, although in most instances direct gravity feed will probably be employed. The induction system is of very simple type, the manifold being cast integral with the central portion of the crankcase, and thus the fuel mixture is heated and the oil cooled at the same time. From the central manifold under the crankcase pipes are taken to each side, with forked pipes conducting the mixture to the separate cylinders.

A.D.C. AIRCRAFT, LTD.

THERE is a Cirrus Mk. II 75/80 h.p. engine; a Cirrus Mk. III 85/95 h.p. engine and a Nimbus 300/330 h.p. engine exhibited by the A.D.C. Aircraft, Ltd. Their agents in Germany are Messrs. Raab-Katzenstein Flugzeugwerke G.m.b.H., who have already purchased a number of Cirrus engines for installation in their Pelican light aeroplanes. There is also a Cirrus engine exhibited on the stand of Messrs. Raab-Katzenstein in the German section. Incidentally, five of the largest aircraft manufacturers in Italy are building machines fitted with Cirrus engines, three manufacturers are fitting them in Germany, two in Canada, six in England, and one in Switzerland. Manufacturing licences have been disposed of in Japan and America.

FLIGHT & AIRCRAFT ENGINEER

OCTOBER 11, 1928



AT THE BERLIN SHOW : The 85-95 h.p. A.D.C. "Cirrus Mark III," a 4-cylinder in-line air-cooled engine, an improved development of the Mark II, which is also exhibited.

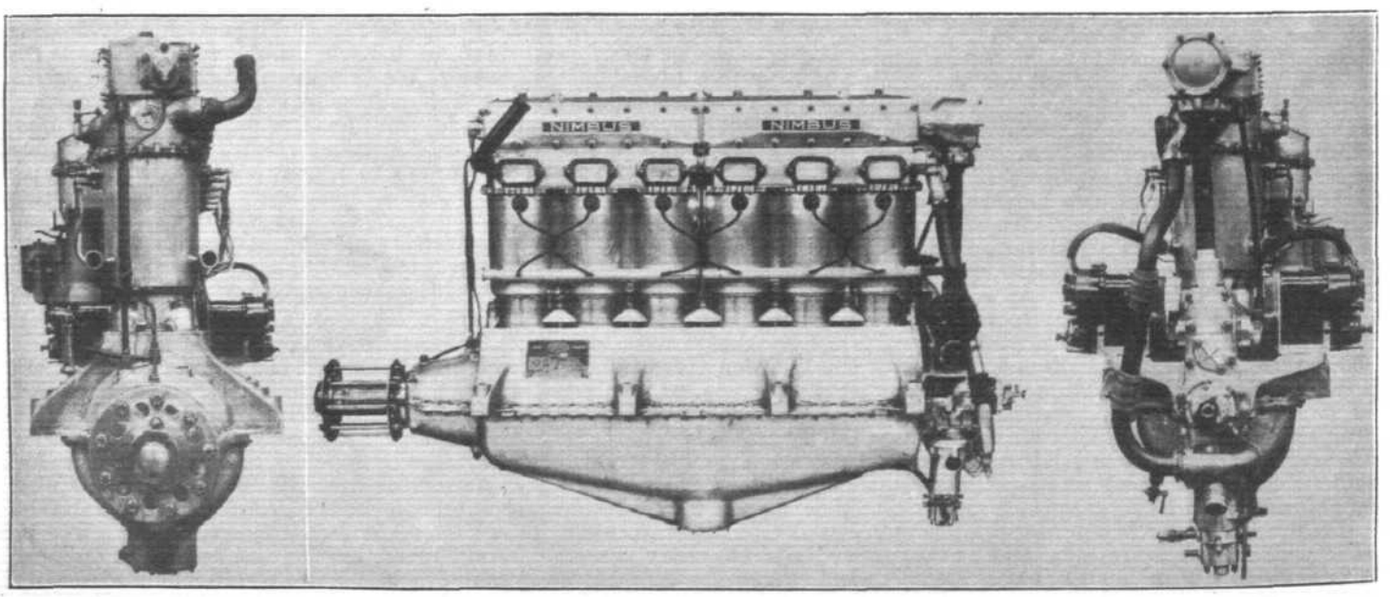
The 85-95 h.p. "Cirrus" engine Mk. III has been produced as an alternative to the Mk. II type, and to meet the special requirements that arise in certain circumstances when increased performance is desirable to obtain more rapid take-off and improved rate of climb, or for seaplane work. Amongst other improvements that have been introduced are cylinder heads of new design, improved cooling arrangement, larger valves and improved valve gear. The features of simple design, sturdy construction, and reliability are fully retained. The weight per h.p. is lowered. Advantages of the 4-cylinder-in-line "Cirrus" air-cooled type engine include low head resistance and less likelihood of frontal damage in forced landings on soft ground. Weight of the "Cirrus," Mk. III engine is 280 lbs. Oil is carried in the lower half crankcase, thus eliminating the necessity for oil tank, pipe lines, etc. The "Cirrus" Mk. III engine has passed the British Air Ministry type test.

Cylinders and heads are separate, the former being cast-iron and the cylinder heads of an aluminium alloy, with air-cooling fins. Each cylinder head is fitted with two sparking plugs. One inlet and one exhaust valve is fitted in each cylinder head ; valves are operated by rocking levers actuated by push rods to tappets in crankcase. Pistons are aluminium-alloy castings, each fitted with three cast-iron rings. A hollow gudgeon-pin of the full floating type is used. Connecting-rods are duralumin forgings of "H" section. Crankshaft is of solid construction, and has direct drive to airscrew. It is located in three intermediate plain bearings and roller bearings at each end. The airscrew shaft is bolted to crankshaft and located in a radial thrust bearing. Crankcase is an aluminium-alloy casting stiffened by three transverse webs. Housings are provided for camshaft bearings and oil pump spindle bearings. Oil base is an aluminium-alloy casting bolted to crankcase.

The camshaft actuates direct to tappets and is supported in three phosphor-bronze and one ball bearing. It is driven through the medium of steel gears housed in crankcase and timing gear cover. It is fitted with central spiral gear driving oil pump spindle and with tachometer drive at rear end.

Lubrication.—The lower half of the crankcase (usually termed the oil base) will contain 12 pints of oil, which is sufficient for about 5 hours' flight. The oil pump is arranged at the lowest part of the base, so that it is always flooded or self-primed with oil. The oil pump, which is a gear type, forces the oil through a gauze filter, which is arranged horizontally just above the pump, thence through the main delivery pipe to the oil gallery arranged on the port side of the engine. The oil gallery is connected to passages cast in the top half of the crankcase, which run to the centre and intermediate bearings ; the oil is thus forced under pressure direct to each bearing.

Ignition.—Two B.T.H. magnetos, type G.A.4, provide dual ignition to the sparking plugs (2 per cylinder). The



AT THE BERLIN SHOW : The 300-330 h.p. A.D.C. "Nimbus" a 6-cylinder in-line water-cooled engine for military or commercial aircraft.

forward magneto is fitted with impulse starter, and the rear magneto is spigot mounted.

Carburation.—One Claudel Hobson R.R.C.H. carburettor is fitted. The engine has standard type engine bearer feet, but low type engine bearer feet, which locate the engine 88·5 mm. lower than the standard feet, can be supplied if required.

Starting Gear.—Turning the propeller to operate the impulse starter has proved so adequate that special starter gear is not fitted, but to meet requirements of light seaplanes a special hand-turning gear can be supplied, provided this requirement is specified at the time of ordering.

The 300-330 h.p. A.D.C. "Nimbus" engine has been specially designed to meet the requirement of an efficient and reliable 6-cylinder in-line water-cooled engine for modern military and commercial aircraft. Considerable research and experiment was made in the design of this engine, and special attention was given to the necessity for adequate arrangement of the water circulation round the cylinder heads and accessibility to the valve seatings. The arrangement of the cylinders in blocks of three gives easy accessibility to the reciprocating parts, and lifting one block of cylinders exposes three pistons and connecting rods for inspection. The principal characteristics which have been obtained in the design of the "Nimbus" engine, include the following:—Low weight per h.p., low petrol consumption, minimum head resistance, easy installation, high efficiency and reliability. The dry weight of the "Nimbus" engine complete with airscrew boss is 670 lb. During the British Air Ministry type test the "Nimbus" engine demonstrated a phenomenally low combined petrol and oil consumption, which probably constitutes a low figure record for any engine run on an Air Ministry type test.

Cylinders.—The steel cylinder liners are screwed into the bottom of the water-jacket blocks, a neat locking arrangement being provided for making a watertight joint. A split locking ring of phosphor bronze is threaded to correspond with the threads on the cylinder liner, a steel strap tightened by a tangential bolt forcing the threads home, and a rubber ring, on being compressed, making a tight joint between cylinder and jacket. At the top the cylinder liners are secured to the cylinder head castings, which are in the form of aluminium alloy blocks, by the valve seatings, which are of special design and splined on the inside for the special tool used for screwing them home. The water jackets are in the form of two aluminium castings, each block enclosing three cylinders. At the top the water jacket blocks are secured to the cylinder head blocks by a number of bolts, the faces of jackets and heads being machined to make a tight fit. The cylinder head blocks, in addition to leaving a large water space around the hottest parts of the engine, are particularly open castings, so that during manufacture inspection is greatly facilitated, and machining operations are reduced to a minimum.

Valves.—One inlet valve and two exhaust valves are fitted, the former being operated from the camshaft by a rocker lever and the latter direct. The valves are manufactured in K.E.965 special valve steel. Pistons are aluminium alloy castings, each fitted with four rings and floating gudgeon pin. Connecting rods are of high tensile steel machined all over to a definite weight in order to ensure accurate balance. Crankshaft is of solid construction and has direct drive to airscrew, located in seven plain bearings and one roller bearing supporting the forward end of the shaft. Crankcase is an aluminium alloy casting stiffened by crossed webs. Oil base is an aluminium alloy bolted to crankcase. Camshaft is located in a casing which forms a complete protection for the whole of the valve gear as well as providing a bridge over the cylinder heads which rigidly locks the blocks together. The shaft is driven through two trains of bevels. Water circulation is provided by a centrifugal pump, driven by an extension of the vertical shaft. Oil circulation to the crankshaft, camshaft, and vertical shaft is functioned by a dual oil pump that is combined with the water pump.

Ignition.—Two 6-cylinder magnetos are fitted and provide dual ignition to the sparking plugs, two per cylinder. Two Zenith 65G carburettors are fitted.

[ARMSTRONG SIDDELEY MOTORS, LTD.

FOUR different types of Armstrong Siddeley aero engine are exhibited on Stand 51 in Hall II—the "Jaguar," the "Lynx," the "Mongoose," and the "Genet."

The 425/450 h.p. 14-cylinder "Jaguar" engine is shown in its standard form, and little more may be added to what is already known of this world-famous engine—the hero of many an outstanding achievement in the Aviation World. Although it is not being shown at this exhibition, Armstrong Siddeley Motors, Ltd., are also manufacturing in large quantities, the Jaguar type engine in a supercharged form, a few details of which may be of interest.

The supercharger, which is bolted and spigotted on to the rear face of the Standard "Jaguar" crankcase, whilst, being a separate unit, becomes, when fitted, an integral part of the engine. It consists of an aluminium induction casing, which houses the support plate and gears driving a rotor, and an induction casing cover, which encloses the rotor and large and small guide vanes. The combined induction elbow and heater box are bolted to the central intake or orifice in the rear face of the induction cover, which also provides the housing for the bevel gears driving the two magnetos, and an auxiliary oil pump supplying oil to the rear bearing of the rotor.

The blower is placed between the carburettor and the engine, thus obtaining, in addition to other advantages, the full benefit of the mixing effect of the fan, and eliminates the need of pressure balancing the fuel tanks and carburettor.

The altitude mixing control lever is used in the same way as on the normal unsupercharged engine.

In order to meet the needs of certain phases of aviation, Armstrong Siddeley Motors are now manufacturing the "Jaguar" engine in a geared form. The gear, which is of simple epicyclic construction, is situated at the front of the engine, and whilst reducing the propeller speed, it enables the revolution of the engine to be increased, and consequently a higher performance is maintained.

The increase in weight by fitting the gear to the normal "Jaguar" engine is 60 lbs. only, and there is a remarkably small addition of 3½ in. to the overall length.

The efficiency of the aircraft when fitted with the geared "Jaguar" engine, is considerably increased, more power, quicker climb and still smoother running being experienced. The geared "Jaguar" is now being adopted by the Imperial Airways, Ltd., for the London to Paris Air Line.

The 215/225 h.p. "Lynx" engine is the second engine exhibited on this stand. This type of engine is now being extensively used in many countries, including Canada, Italy, Holland, Australia, India, Sweden, France, etc., and, it will be remembered, has been adopted by the Munich to Milan and Amsterdam-Batavia Air Lines as a direct result of the wonderful flight of 18,000 miles from Amsterdam to Batavia and back in 21 flying days, achieved by Lieut. Koppen, the famous Dutch Pilot, in a Fokker F VII aircraft fitted with three "Lynx" engines.

The "Lynx" engine—which is, in effect, half a "Jaguar"—has a single bank of seven cylinders, the master connecting rod and six auxiliary rods being mounted on a single-throw hollow crankshaft. The crankshaft with bronze balance weights on the outer webs is carried on three roller bearings, and is located by a double-acting ball-thrust bearing at its front end. The rear end of the crankshaft carries the induction fan.

The drives of the cams and oil pumps are all taken off the front end, and the drive for the magnetos is taken off the rear end of the crankshaft, a special splined shaft being provided.

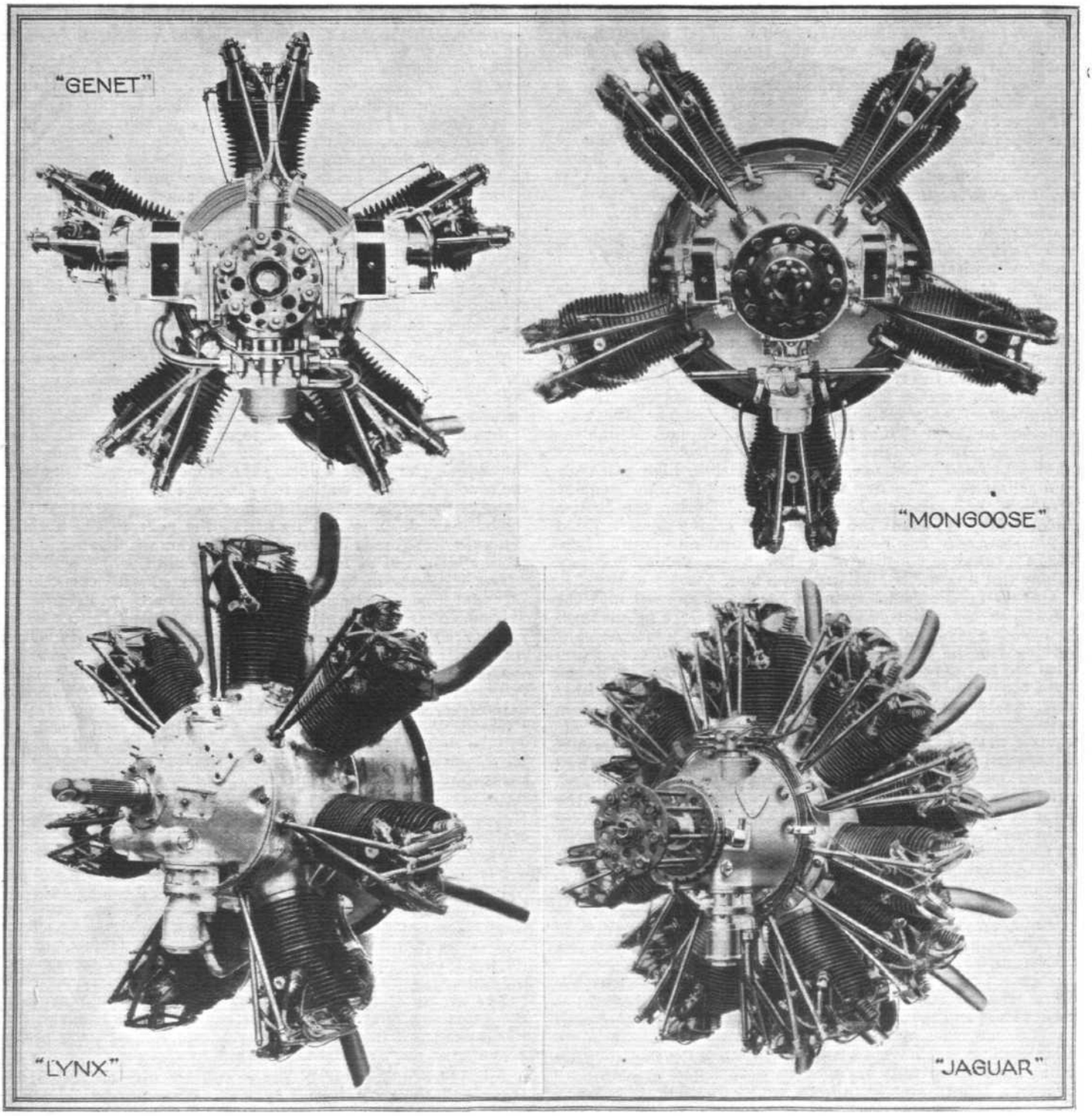
All Armstrong Siddeley radial engines are lubricated on the standard "dry base" system. Two pumps "Feed" and "Scavenge" of the gear type are fitted, the scavenge pump being of about 20 per cent. greater capacity than the feed pump so as to ensure that the base is drained at all times.

Oil is drawn from the tank and forced by feed pump through a filter to the hollow crankshaft. After the cycle of lubrication is complete, all the oil released inside the engine drains to the sump, whence it is returned to the tank by the scavenge pump, by way of jackets around the induction fan casing and heater box, which serve to cool the oil and warm the incoming mixture at the same time.

The 130-135 h.p. "Mongoose" engine, although a comparatively new product, has been thoroughly established after extensive tests, both on the bench and in the air, and during the past year has steadily increased in popularity as a power unit for training aircraft. This engine gives ample power for training purposes, and is extremely economic in running.

The "Mongoose" engine has five cylinders disposed radially on a single-throw crankshaft, and is very similar in construction to the "Jaguar" and "Lynx" engines.

It is interesting to note that the greater number of the major components in the "Jaguar," "Lynx" and "Mongoose" engines are interchangeable. The degree of interchangeability between the "Jaguar" and "Lynx" engines covers the following components: cylinder complete



ARMSTRONG-SIDDELEY ENGINES AT THE BERLIN SHOW: Four types, shown above, are on view; the "Genet," the "Mongoose," the "Lynx," and the "Jaguar." All are air-cooled radial engines.

with valves, valve mechanism, etc., pistons, gudgeon pins, etc., master and auxiliary connecting rods; front nose piece and timing gear; oil pump and filters; propeller boss and bolts; bearer plate and various minor details.

It will be realised that, from an economic, service and maintenance point of view, this policy is an important step towards better and cheaper flying services.

The 80-88 h.p. "Genet" five-cylinder engine represents the latest developments in air-cooled practice. This engine is eminently suitable for the owner-piloted light aeroplane, being most economical to run and easy to maintain. It is extremely simple in construction and, we believe, is 100 lbs. lighter than any other engine of similar power.

Dual ignition, rubber-covered push rods, complete accessibility to all adjustments, cleanness and smoothness in running and easy maintenance are amongst the many finer features of the Armstrong Siddeley aero engines.

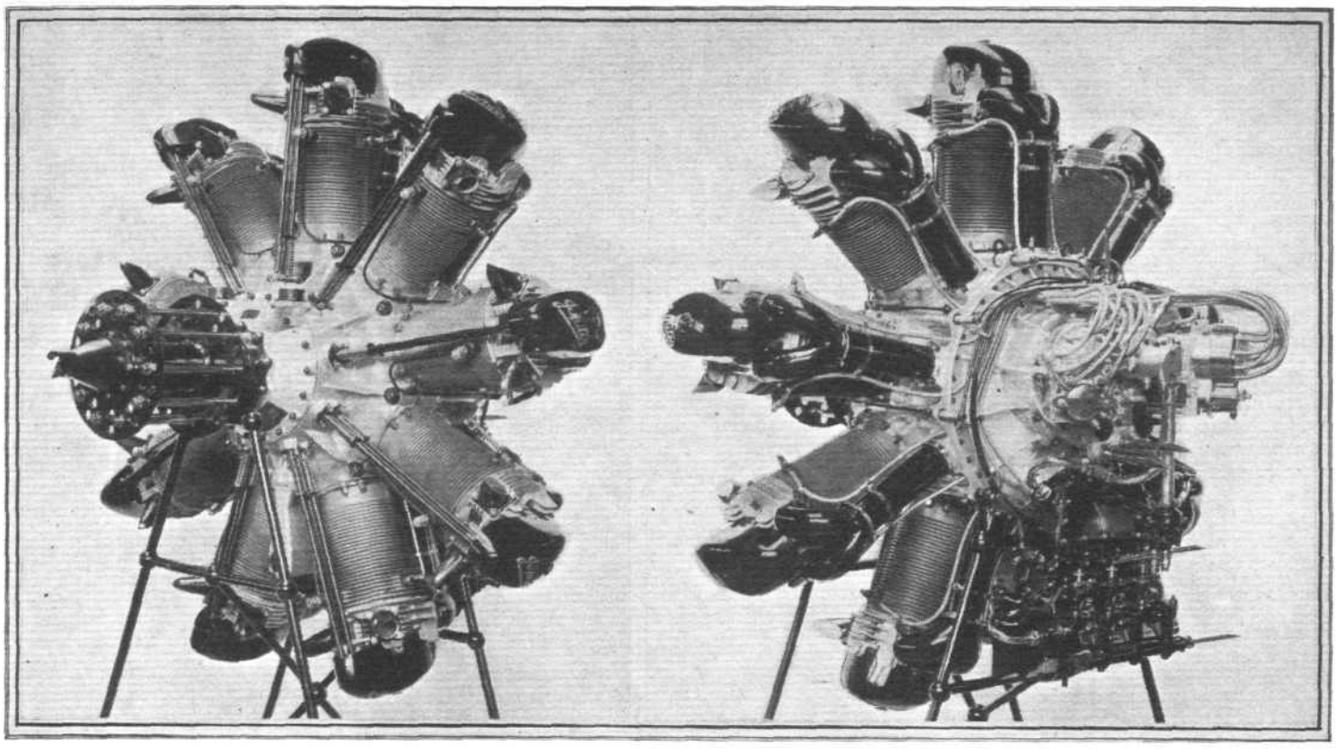
The new valve rocker gear (as seen on the "Lynx" engine) is, after exhaustive tests, being standardised on the "Jaguar" and "Mongoose" engines. The rocker end is inclined to bring it into line with the push rod, thus preventing any side thrust on the rocker bearing. The top ball end of the push rod has been flattened, and the thrust is taken on the pad in the valve rocker cup, which is radiused slightly at right angles to the rocker, giving universal action. A fully-grooved distance piece is now employed giving a very free access for the grease to the bearing.

Easy adjustment of the valve clearances is now obtained by screwing or unscrewing the valve rocker cup from above the rocker.

THE BRISTOL AEROPLANE CO., LTD.

In so far as aero engines are concerned, the Bristol Aeroplane Co. of Filton, Bristol, is well represented at the Show. Altogether, they are exhibiting four types of aero engines. Of these, three are of the "Jupiter" family, while the fourth is the new cousin, "Titan." The four types shown are:—the "Jupiter VIA," the "Jupiter VII," the "Jupiter VIII," and the "Titan."

Bristol "Jupiter" engines—especially the Series VIA—are, we think, well known to most people in the world of aviation, so it will not be necessary for us to describe in



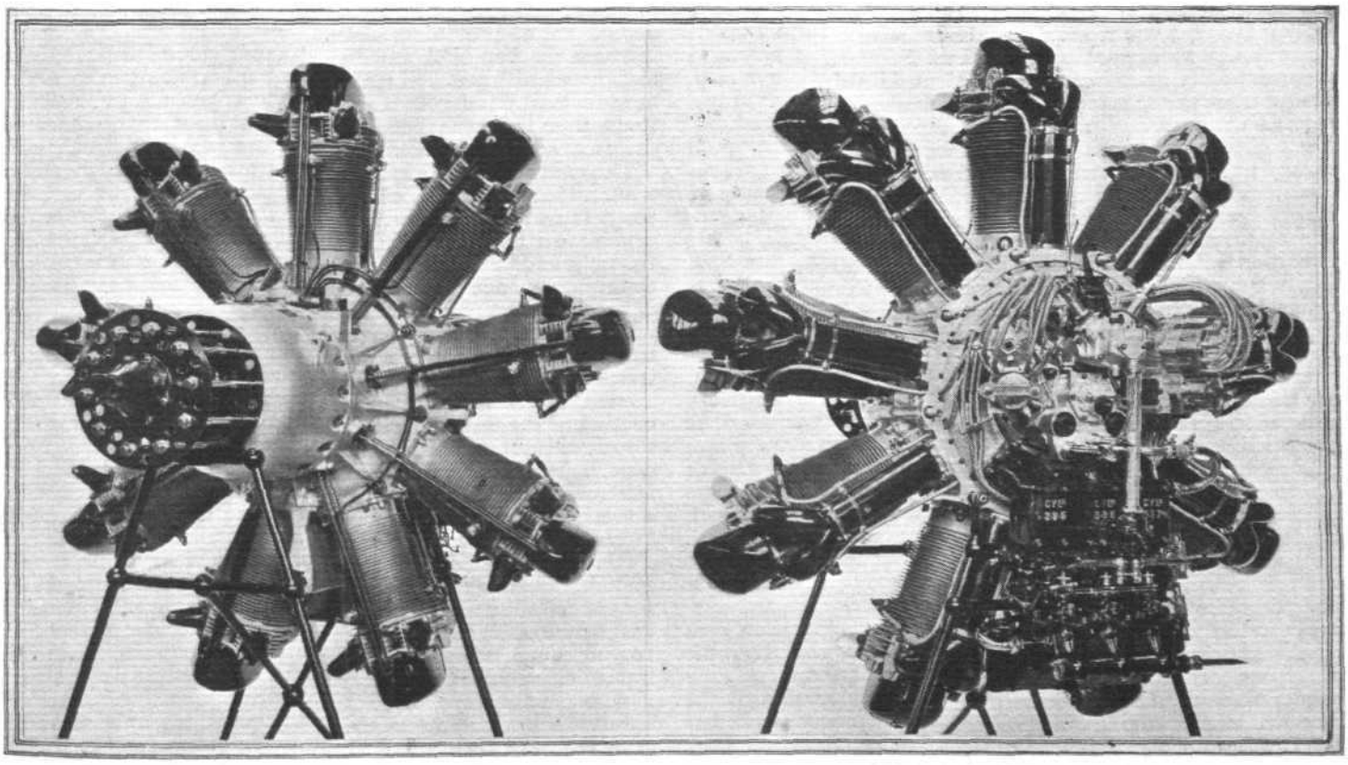
BRISTOL "JUPITERS" AT BERLIN : The Series VII, or supercharged model, giving 440 h.p. at 1,950 r.p.m.

detail each type exhibited—even if we had the space to do so. We will, however, briefly run over the special features of each, and give the more important items from their specifications.

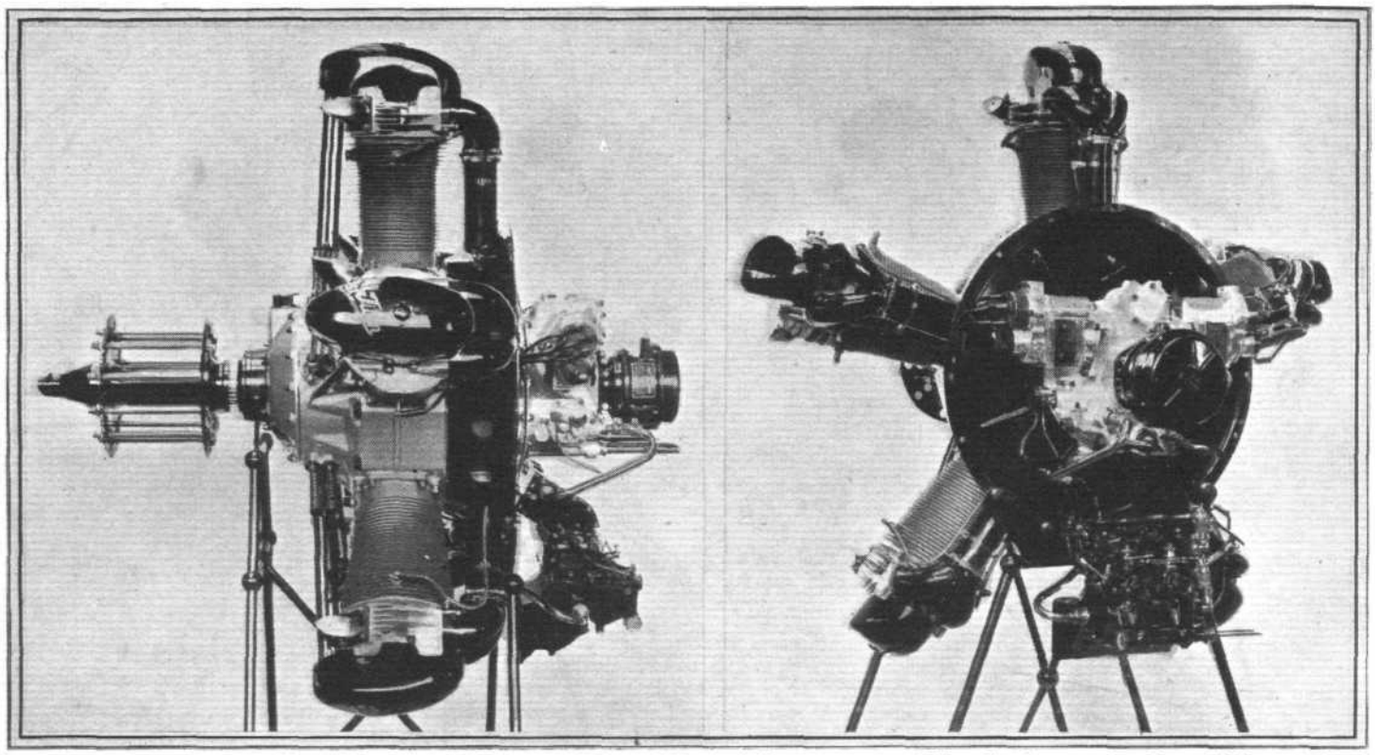
Generally speaking, all these engines are of similar construction, varying mainly in certain details according to the purpose for which each type is intended—whether direct drive, geared, or supercharged, etc. There are, however, certain refinements on these exhibition engines, and it is to these features we intend to refer, assuming that the reader is familiar with the general Bristol construction. All the "Jupiters" are, of course, 9-cyl. air-cooled radial engines the "Titan"—in which a large number of standard "Jupiter" parts are employed in its construction—being a 5-cyl. radial.

The "Jupiter VIA" is a high-compression version of the well-known series VI direct-drive engine. In the "Jupiter VII," we have a supercharged engine, or one fitted with a mechanically-driven blower or "booster," which provides a certain degree of supercharging enabling the engine to produce its full power at 12,000 ft. The series VIII—a comparatively recent member of the family—is a geared engine.

Turning now to the refinements. For instance, in the Series VIA and the "Titan," the arrangement of the auxiliaries on the back of the engine have been altered. The magnetos are now located at right angles to the crankshaft—as are also the petrol pumps—instead of being placed at an angle diagonally. As a result of this arrangement, a space is obtained in the centre of the engine for the fitting of an



BRISTOL "JUPITERS" AT BERLIN : The Geared "Jupiter VIII," which develops 480 h.p. at 2,200 r.p.m.



BRISTOL " JUPITERS " AT BERLIN : The " Titan " a medium-powered 5-cylinder engine in which standard " Jupiter " parts are employed extensively in its construction.

" Eclipse " impulse starter, the hand crank for which is inserted from one side of the engine.

Improvements are also to be found in the valve gear. The valve rockers have been mounted on ball bearings, whereby the period between oilings is increased to about 100 hrs. Contact between rocker and valve stem is now by a spherical steel ball, above which is inserted a small felt pad soaked in oil, ensuring the efficient lubrication of this part.

Again—and this applies to all four models—the valve rockers are enclosed in neat metal " helmets," which not only protect the rockers from dust, etc., but prevent any oil leakage from the valves being thrown back over the machine.

At this point we are afraid we must conclude with the following brief specifications of each type.

" *Jupiter* " *Series VI.A.*—Bore, 5·75 in. (146 mm.); stroke, 7·5 in. (190 mm.); volume, 1,753 cub. in. (28·7 litres); normal speed, 1,700 r.p.m., maximum speed, 1,870 r.p.m.; rated power at normal speed, 415 at 5,000 ft. (1,525 m.); rated power at maximum speed, 455 at 5,000 ft. (1,525 m.); compression ratio, 6·3 to 1; standard weight bare, 720 lbs. (327 kg.).

" *Jupiter* " *Series VII.*—Same bore and stroke. Normal speed, 1,755 r.p.m.; maximum speed, 1,950 r.p.m.; rated power at normal speed, 420 at 12,000 ft.; rated power at maximum speed, 440 at 15,000 ft.; compression ratio, 5 to 3; weight bare, 760 lbs. (398 kg.).

" *Jupiter* " *Series VIII.*—Same bore and stroke; normal speed, 2,000 r.p.m.; maximum speed, 2,200 r.p.m.; compression ratio, 5·8 to 1; rated power at normal speed, at 4,000 ft. (1,220 m.), 440 b.h.p.; rated power at maximum speed, at 4,000 ft., 480 b.h.p.

" *Titan.*"—Bore, 5·75 in. (146 mm.); stroke, 6·5 in. (165 mm.); total swept volume, 842 cub. in. (13·8 litres); compression ratio, 5 to 1; rated normal power, 200 b.h.p. at 1,700 r.p.m.; maximum power, 220 b.h.p. at 1,870 r.p.m.; weight dry, 500 lbs. (227 kg.); fuel consumption, 13 gallons per hour; oil consumption, 2 pints per hour. A service type with higher compression ratio (5·3 to 1) is also produced, developing 220 h.p. at 1,700 r.p.m. and a maximum of 240 h.p. at 1,870 r.p.m.

D. NAPIER AND SON, LTD.

ONE of the latest type of aero engines is being shown on Stand 52 by D. Napier and Son, Ltd., of Acton, viz., the Series XI Napier " Lion."

The Napier " Lion " (Series XI) is a development of the 450-h.p. Napier engine (Series V) which, for many years, has held sway in the aero engine world. It also embodies many of the principles which proved successful in the 875-h.p. racing Napier engine, which helped so materially to bring the Schneider Trophy back to England in September, 1927.

This new Napier engine develops 570 h.p. at 2,585 r.p.m., which is a considerable increase on the 450 h.p. obtained from the " Lion " with which the Heinkel seaplane secured the highest marks in the 1926 Warnemunde commercial seaplane competition. It has already successfully passed the British Air Ministry Type Test, whilst one of these engines installed in a De Havilland " Hound " recently secured three world's speed records.

The main advance with this latest Napier is in the greatly increased power that is obtained without any loss in reliability, whilst it is also streamlined in a manner which makes it easier to install in aircraft.

The 12 cylinders—which are arranged in the usual three blocks of four, broad-arrow fashion—are steel forgings, machined all over, with steel water jackets and detachable alumin aluminium cylinder head containing inlet and exhaust passages, valves and valve actuating mechanism. The pistons are of aluminium alloy.

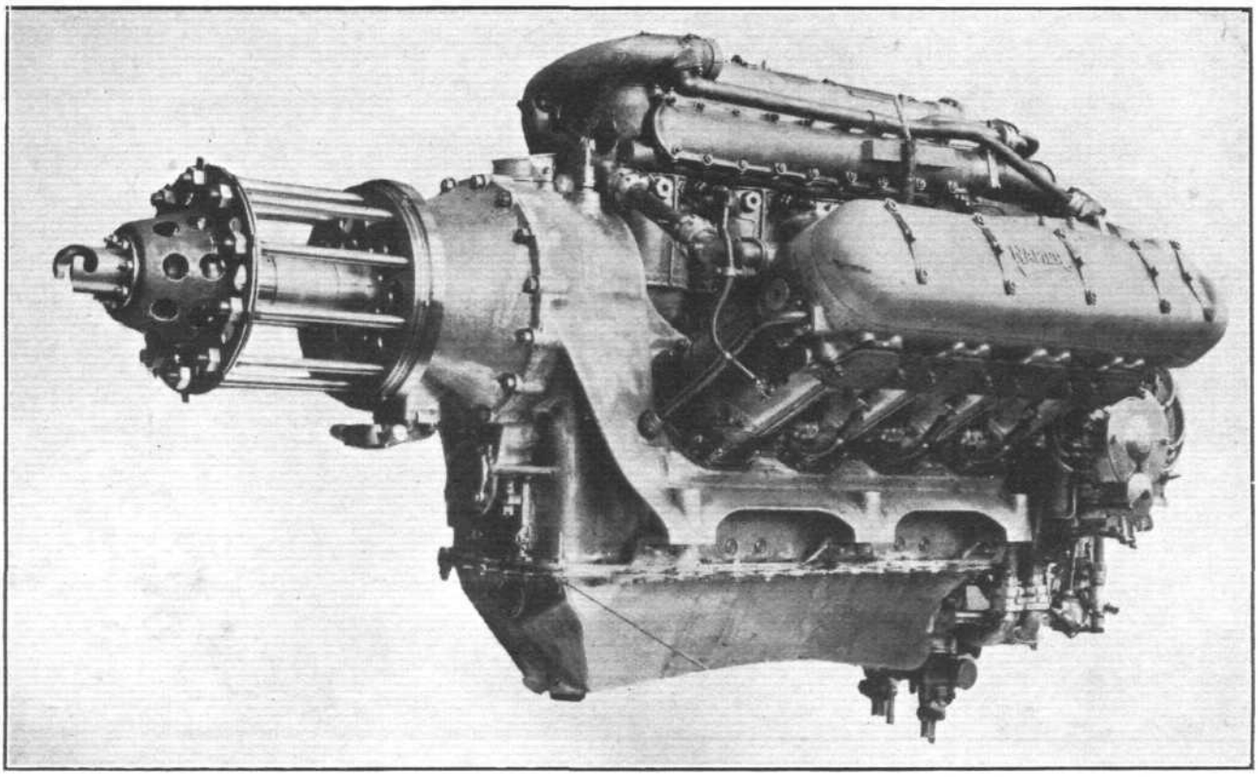
There are two inlet and two exhaust valves per cylinder, each fitted with two coil springs, and operated direct by overhead camshafts driven through bevel gearing by vertical shafts from the crankshaft. The whole of the valve mechanism enclosed within a detachable aluminium case.

The connecting rods are machined from special high grade steel. The master rod, coupled to the pistons of the vertical block of cylinders, being formed with lugs on either side, to which are attached the short auxiliary rods for the pistons of the right and left groups of cylinders. The big ends are white metal-lined, while anchor pins and other parts work in bushes of ample size.

The crankshaft, which is machined from a solid steel forging has its four throws in one plane and all journal bearings and crankpins are of large diameter and bored out. The shaft is carried in five substantial roller bearings and a large plain bearing at the forward end. Reduction (1 to 1·885) between the airscrew and crankshaft is through high grade alloy steel spur gears enclosed in the front end of the crankcase. The airscrew shaft—carried on two roller bearings—is fitted with a large double thrust ball bearing taking the thrust of either " tractor " or " pusher " air screw.

The crankcase is of aluminium, stiffened at all necessary points, and the rear cover contains the oil pumps, the drive for the camshafts, magnetos, water and oil pumps. There are two suction and one pressure oil pumps, the former scavenging the oil sump, returning the oil to the supply tank, and the latter delivering oil from the tank to the working parts of the engine, under pressure.

Lubrication is by pressure throughout to big ends, gudgeon pins, bearings of camshaft and forward gearing of the crankshaft. The reduction gears are lubricated by oil projected on to the teeth from a pipe connected to the crankshaft lubricating system. Valve tappets and cams are lubricated



THE "LION" AT BERLIN: The 570-h.p. Napier "Lion" Series XI engine, the latest development of the world-famous 450-h.p. Series V "Lion."

by the oil escaping from the camshaft bearings, which drains into the sump. An adjustable pressure relief valve is incorporated in the system.

Two 12-cylinder magnetos, mounted on platforms at the rear end of the engine, provide the ignition, and special distributors are fitted to facilitate starting by hand. Advance and retard links and levers are interconnected with the throttle control.

A Napier-Claudel triple carburettor is fitted; this is water-jacketed and the body, which is of aluminium, is carried on a bracket on the rear end cover. The gas-inlet pipes to the induction on the cylinder heads are of steel and are also water-jacketed. Altitude control cocks are fitted and are interconnected with throttle control.

The series XI "Lion" is produced for either "tractor" or "pusher" aircraft, while the Napier petrol starter is provided—by means of which fuel is pumped into the cylinders and ignited by a hand-starting magneto. A hand-turning gear for starting the engine is also fitted.

The normal rating of this engine—the bore and stroke being $5\frac{1}{2}$ in. (140 mm.) and $5\frac{1}{2}$ in. (130 mm.) respectively—is 530 b.h.p. at 2,350 r.p.m.; the power at maximum speed is 570 b.h.p. at 2,585 r.p.m. The compression ratio is 6·0 to 1.

The fuel consumption will not exceed 0·55 pint per b.h.p. at full load and normal speed. This consumption is equivalent to 0·53 lb. per b.h.p./hour with fuel of a specific gravity of 0·775. The average fuel consumption at full load as above is 0·50 lb. per b.h.p./hour. The average oil consumption is 0·0235 lb. per b.h.p./hour.

ROLLS-ROYCE, LTD.

THIS well-known firm of aero-engine constructors are exhibiting one of their recent products—the F-type aero engine, which has already been put into quantity production. It was designed to meet modern requirements, and past experience with previous Rolls-Royce models, which have many successes to their credit, has helped in its production.

The Rolls-Royce F-type engine is a 12-cyl. water-cooled "V," fitted with a spur reduction gear for the air screw. It it supplied in four models, which differ in respect to the reduction gear ratio and the compression ratio, *i.e.*, Series F.XI.A. (490 b.h.p.), having a reduction gear ratio of 0·632 and compression ratio of 6 : 1. Series F.XI.B. (480 b.h.p.), the same, but with 7 : 1 compression ratio. Series F.XII.A. (490 b.h.p.), having a reduction gear ratio of 0·552 and 6 : 1 compression ratio. F.XII.B. (480 b.h.p.), the same as XII.A, but with 7 : 1 compression ratio. In other respects, these four models are identical, so that the following notes on the constructional features of the F. type apply to all.

The cylinders (in blocks of six, at 60°) are of cast aluminium provided with steel liners, and renewable valve seats. The heads are integral with the cylinder blocks.

Two inlet and two exhaust valves are provided per cylinder, operated by camshafts (one per cylinder block) and rockers mounted on top of the cylinder heads, and totally enclosed by means of a removable cylinder head cover. The whole of the valve mechanism is positively lubricated.

The camshafts are machined from 5 per cent. case-hardening nickel steel bar, the bearing surfaces and cam faces being hardened and ground, while the valve rockers are 5 per cent. case-hardening nickel steel forgings, machined all over and provided with hardened cam follower faces and hardened steel adjustable tappets.

The gears for driving the camshafts and all auxiliaries are driven from the rear end of the crankshaft, through the medium of a spring drive to eliminate crankshaft torsional vibrations from all auxiliary drives. The gears are made from 5 per cent. case-hardening nickel steel, and worm wheels made from phosphor bronze, and all gears are fitted to shafts running on ball bearings and totally enclosed in a suitable casing.

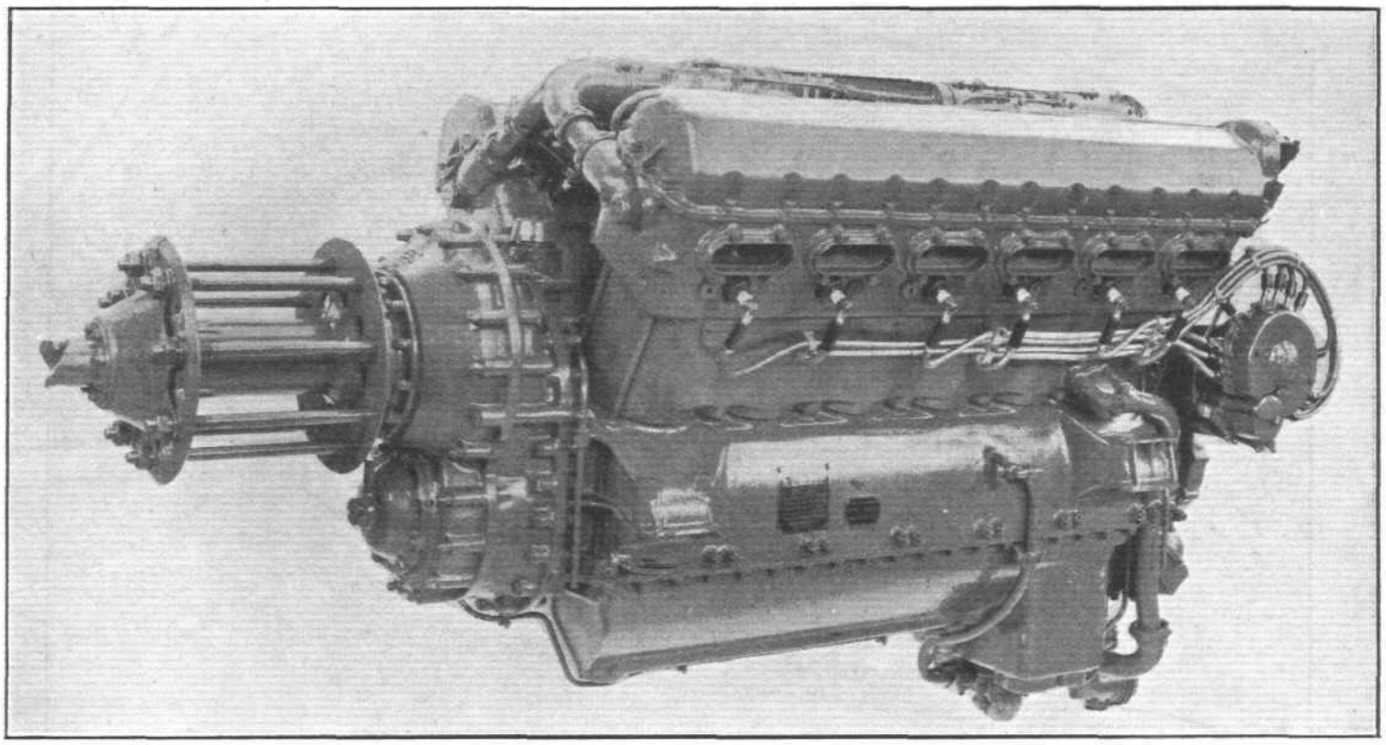
The camshafts are driven by means of inclined tubular driving shafts with bevel gears at the upper and lower ends. Out-of-alignment and expansion effects are allowed for by hardened serrated couplings. The driving shafts are supported in ball bearings, and the whole totally enclosed in tubular casings.

The pistons, made from special aluminium alloy forgings machined all over, are of special design, which enables the heat to be dissipated in order to keep the temperature of the piston heads as low as possible.

Four piston rings are provided, three being arranged as compression rings above the gudgeon pin and one scraper ring below at the base of the piston skirt. The compression rings are prevented from rotation by means of stops.

The connecting-rods are "H" section of the "forked" type, made from $3\frac{1}{2}$ per cent. nickel steel forgings, heat treated to give a high brinell, and machined all over to reduce weight variations. A divided white metal-lined steel block is bolted to the forked rod. The plain rod works upon the centre proportion of the steel block, the latter having white metal bearing surface. The small ends of both rods are fitted with "floating" phosphor bronze bushes. All bearings are positively lubricated under pressure.

The six-throw crankshaft is machined from a nickel chrome steel forging, all the journals and crankpins being bored for lightness and to convey lubricating oil to all bearings and connecting rods. All crankpins and journals are accurately



ANOTHER BRITISH AERO ENGINE AT BERLIN : The Rolls-Royce Type F.XII, a 12-cylinder " V " water-cooled engine developing 480-490 h.p.

ground to close limits for size and trueness of diameter. The crankshaft is carried in seven bearings of ample proportions.

The main bearings, consisting of divided mild steel shells, white metal lined, are held in the upper half of the aluminium alloy crankcase by special caps which are secured by suitable bolts on each bearing. Facings are formed on either side of the caps which fit between corresponding facings formed on cheeks within the upper half crankcase. Transverse bolts pass through the crankcase and caps. This arrangement secures the rigidity of one in which the caps are integral with the lower half, while retaining the advantages of caps bolted only to the upper half.

Two Rolls-Royce " Duplex " carburettors are provided, fitted with hand control by which the flow of petrol from the float chamber to the jet is regulated to suit varying altitudes. Special compensating passages are provided in the carburettor, which maintain under all conditions the same pressure in the float chamber as in the throat, thereby neutralising eddy-current effects. These passages also enable the float chamber cover to be sealed, thus reducing the risk of petrol leakage.

Two 12-terminal high-tension magnetos are fitted and are supported on the auxiliary gear case from which they are driven by means of serrated couplings. Incorporated in the latter is a device for enabling a fine and positive adjustment of the ignition timing to be effected. Two sparking plugs of approved make are fitted to each cylinder.

A single spur gear reduction is fitted at the front end of the crankshaft, through which is transmitted the drive to the airscrew. The pinion is driven from the crankshaft through a short shaft, having teeth at the inner end to engage an internally-toothed flange bolted to the crankshaft and at the outer end teeth engaging with teeth cut inside a part of the gear pinion. The use of this shaft prevents loads from the gear pinion coming on to the crankshaft.

The gear wheels are carried on large-size roller bearings, mounted in a substantial cast aluminium case.

The lubrication of the engine is on the " dry sump " system, the bulk of the oil being carried in a service tank separate from the engine. Two " scavenger " pumps and one " pressure " pump are carried at the rear end of the lower half crankcase—one " scavenger " pump being arranged to draw oil from the forward end of the crankcase, and the second one delivers the oil to the service tank. The " pressure " pump takes its supply from the service tank and delivers it to the main bearings and other parts under suitable pressure.

Each " scavenger " pump is provided with a filter, each filter being contained in the oil pump casing. The main filter for the pressure pump is supplied as a separate unit. A compound relief valve regulates the pressure in the main system, and also adjusts the pressure of an auxiliary low-pressure system which supplies oil to the camshaft bearings and their drive mechanism.

Hand-starting gear is provided, so arranged that the starting handle can be used either side of the engine, while the airscrew hub is formed to take a Hucks' starter.

The main particulars of the Rolls-Royce " F " type engine are :—

Bore, 5 in. (127 mm.). *Stroke*, 5·5 ins. (140 mm.). *Normal crankshaft speed*, 2,250 r.p.m.; *maximum speed*, 2,500 r.p.m. *Reduction gear ratio* (F. XI. A. & B.), 0·632; (F. XII. A. & B.), 0·552. *Compression ratio* (F. XI. A. & F. XII. A.), 6 : 1; (F. XI. B. & F. XII. B.), 7 : 1. *Normal B.H.P.* (F. XI. A. & F. XII. A.), 490; (F. XI. B. & F. XII. B.), 480. *Fuel consumption* (F. XI. A. & F. XII. A.), 30 galls./hr. (135 lit./hr.); F. XI. B. & F. XII. B., 28·25 galls./hr. (127 lit./hr.). *Oil Consumption*, 5 pts./hr. (2·8 lit./hr.). *Weight*, including carburettors, magnetos, engine feet and airscrew hub, but excluding exhaust boxes, radiator, airscrew, oil, fuel and water 865 lbs. (301·76 kg.). *Overall dimensions*.—Length, 5 ft. 3·4 ins. (1·611 m.); width, 2 ft. 0·4 in. (0·619 m.); height, 2 ft. 10·5 in. (0·876 m.).

ROYAL AERONAUTICAL SOCIETY

THE Royal Aeronautical Society, the oldest institution of its kind in the world, is represented by an historical exhibit of a notable character. The exhibit illustrates, by means of a carefully chosen selection of rare books, engravings, drawings, manuscripts, and photographs, the gradual evolution of the idea and the practice of flight in Great Britain, from the earliest down to recent times. It is safe to say that from the British historical standpoint no more interesting and illustrative collection, arranged as far as possible in chronological order, has ever been publicly displayed in this country or abroad. Indeed, in view of a common misconception that the part played by Great Britain in the development of aeronautical science at large was, until quite recent years, of negligible extent, the exhibit may well serve a corrective and useful service. There are few, for instance, who fully appreciate the fact that the foundations of the modern science of aerial navigation, both as to heavier and lighter-than-air, were truly laid by an Englishman, Sir George Cayley,

over one hundred years ago. The Society are peculiarly fortunate in being able to include in their exhibit a selection from Cayley's own papers, which have been lent by the courtesy of Sir Kenelm Cayley, the present owner.

These papers include a note-book used by Cayley between 1800 and 1810, which may, with reason, be claimed as the most important aeronautical manuscript of the 19th century known to be extant. It contains records of his experiments with a primitive form of whirling-arm—vastly different in structure from the immense electrically-driven apparatus at the National Physical Laboratory, though designed for an essentially similar purpose—on the results of which, taken in conjunction with other experiments with small screw-propellers and gliders, he based his reasoned conviction that flight was a mechanical problem capable of assured solution. In other words, he was the first to lay down " that the inclined plane, with a horizontal propelling apparatus, is the true principle of aerial navigation by mechanical means." And because he realised that engine power was " the *sine qua non* of the case," he spent a great part of his life in trying to develop some type of caloric or explosion engine applicable to the purpose. The note-book also contains a description, with drawings, of a " tension-wheel," specifically invented by Cayley for use with mechanical flying machines—a type of wheel which actually proved to be almost indispensable on the invention of the aeroplane, and which in its vastly wider application to the bicycle has become of world-wide utility.

Other manuscripts in Cayley's own hand deal with such questions as the possibility of using bi-plane or tri-plane wing-surfaces, and the great importance of reducing resistance by " ovalling " the section of supports or struts, and even the cords which he proposed to use for " diagonal bracing." Cayley's work is further remarkable in that throughout a period of over 40 years he combined practical experiments with theoretical reasoning. That towards the end of his life his ideas had projected themselves, so to speak, half-a-century ahead, may be seen in the draft reply of a letter to W. S. Henson, the designer of the first power-propelled monoplane, in which Cayley—warning Henson that progress must inevitably be slow—points out, with tragic foresight, that " a hundred necks have to be broken before all the sources of accident can be ascertained and guarded against."

In the direction of airships—navigable balloons as he termed them—Cayley was equally ahead of his time, and as early as 1817, and again in 1841—the papers exhibited include a draft speech of the latter period—he urged the formation of an Aerostatic Institution, because he believed that the principle of " balloon floatage " would be practicable before mechanical flight, and because he knew that few, if any, individuals could undertake the great cost of carrying out experiments. For he fully realised the main principle on which airship theory rests, and was convinced that airships would have to be built on a very large scale. Hence his suggestion for dividing the gas container into several compartments, and hence also his suggestion that the form of the navigable balloon which he described—an elongated spheroid of 300 ft. in length—would have to be maintained by " light poles and internal cross bracings of wire." In this connection, it can only be added that Cayley regarded the airship as likely to afford " greater facilities for transporting men and goods through the air than mechanical means alone," and he gave expression to the belief that they would ultimately be used for the longer voyages, with mechanical flying machines serving a complementary purpose for " less remote distances."

But if the Cayley papers are, in their way, the most interesting exhibit, they form but a very small part of the whole story. That story begins with the legend of King Bladud, the " British King who tried to Fly," who is said to have ruled Britain in the fourth century B.C., and who—as told in the picturesque verse of the " Mirror for Magistrates "—was killed in London trying to achieve winged flight. In the scientific sense, it begins in the 13th century with Roger Bacon, the first man of learning to write of " flying machines," and is continued in the 17th, with the printed writings of the " Flying Bishop," John Wilkins, and the great mechanician, Robert Hooke, who is said to have " invented thirty several ways of flying " before he left Westminster School. A century later, the " romance of flight " is exemplified in the first German translation of Dr. Johnson's " Rasselas "—a rare edition printed at Mainz, with the English text, in 1785.

From the period of the invention of the balloon in 1783, the material, both in books and engravings, becomes more profuse. The exhibit is especially remarkable in the latter respect, and comprises from fifty to a hundred rare engravings ranging from 1784 to about 1860. Notable amongst these are several fine coloured aquatints of the ascents of James Sadler, the first English aeronaut—he made his first ascent from Oxford in October, 1784—and more remarkable as an inventor than is generally known. Many of the books are of special interest as describing notable flights or as dealing for the first time with different aspects of the application of ballooning—for instance, Dr. Jeffries' narrative of the first Channel crossing in 1785, or Major Money's first treatise on military ballooning, 1803. Of particular interest in connection with this German exhibition are the prints and documents connected with the record voyage of Charles Green's famous " Vauxhall " ballon to Weilburg in Nassau, the latter including the original congratulatory address presented to Green and his two companions by the Magistrate and Town Council of Weilburg in 1836. The ballooning history of the last half of the 19th century is illustrated by the doings of Henry Coxwell—who, in 1845, published the first English aeronautical magazine—and James Glaisher, who undertook several famous high ascents with Coxwell for scientific purposes, and who was mainly instrumental in the foundation of the Royal Aeronautical Society in 1866. The Society's exhibition, held at the Crystal Palace in 1868—a copy of the catalogue is exhibited—was the first aeronautical exhibition to be held in any country, and it was especially notable by reason of the presence of John Stringfellow, who was the first to construct and fly a small power-driven model aeroplane.

Of later interest in the field of aviation are such items as letters from Percy Pilcher—the first Englishman to be killed in experiment with a glider—in one of which, dated as early as 1898, he tells of his intention to make an oil engine suitable for use in one of his " soaring machines," an intention which his death most unhappily prevented. A much longer life of aeronautical endeavour—one which has not yet been adequately appreciated by his countrymen—is fully illustrated in the four large note-books and letter-books of Lawrence Hargrave. Hargrave, in early life, went out to Australia, and his countless experiments with model flying machines and box-kites—the latter his own invention—were carried out in the neighbourhood of Sydney, between about 1884 and 1915. The exhibition of these note-books, which belong to the Society, is some offset to the fact that (owing to the indifference of the land of his birth and of adoption) his remarkable series of model flying machines were destined to find a home in the famous Deutsches Museum at Munich.

In all, the Society's exhibit comprises between 300 and 400 separate items, and by means of photographs, the story is brought down to early types of British aeroplanes and airships, and such great achievements in aerial navigation as the first aeroplane crossing of the Atlantic in June, 1919, and the complete double voyage from England to America—a record not yet equalled — of the airship R.34. Finally, the significance and extreme interest of the whole exhibit is vastly increased by the loan from the Air Ministry of the very remarkable and extensive collection of aeroplane models, some part of which were exhibited at Wembley, and which were more recently on view in the Museum of the United Services Institution. The models, which in themselves form a short history of progress, are effectively arranged, being suspended in mid air against an illuminated background of blue. Taken together, the two sections of the exhibit—the books, engravings and manuscripts which deal with history, and the models which tell of constructional achievement—may be held to demonstrate that, while admitting the comparative slowness of Great Britain to take up with adequate enthusiasm and energy the cause of aviation in the early years of the century, her contribution to the science and practice of aeronautics at large has been a very real and notable one.

The selection, preparation and arranging of the great amount of material which has been available have been in the hands of Mr. J. E. Hodgson, the Honorary Librarian of the Society. Mr. Hodgson, who is, of course, well known as one of the leading authorities on aviation history, has not only devoted a very great deal of time and a vast amount of energy to make the exhibit representative and worthy of Great Britain, but he has also lent the Society a large number of valuable books and prints from his own collection, and has obtained permission, from the present representatives of the family, to include Sir George Cayley's aeronautical note-book and other important papers.

FLIGHT

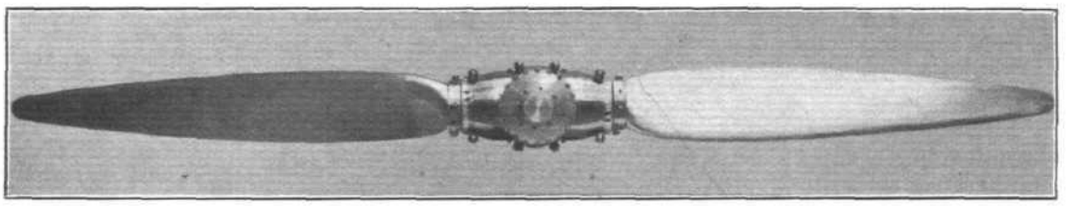
OCTOBER 11, 1928

OTHER BRITISH EXHIBITS

THE GLOSTER AIRCRAFT CO., LTD.

HAVING no commercial type of aircraft available for exhibition, the Gloster Aircraft Co., Ltd., of Cheltenham, Gloucestershire, is, nevertheless, staging a most interesting exhibit in the form of one of the new Gloster Hele-Shaw Beacham variable pitch propellers, the development of which has been carried out by the Gloster firm during the last few years, and which has now definitely reached a stage where it can be said to be a really practical device in which the initial "teething troubles" have been overcome.

The earlier examples of this interesting propeller were, not unnaturally, somewhat heavy. With a new device, and one subject to such considerable centrifugal force stresses as a propeller, the firm very wisely decided on a policy of "safety first" by making quite sure that ample strength was incorporated in the various parts of the mechanism. One may easily imagine what would have happened if, during early tests anything had failed under load. The propeller would have been condemned out of hand, and there would have been an end to further development. By making the first example very strong, if somewhat heavy, and then gradually reducing weight where it was felt to be safe to do so, a mechanism has been evolved which is certainly not unduly heavy. We believe that in point of fact, the difference in weight between the normal fixed-pitch propeller for the Bristol "Jupiter VI" and the variable pitch propeller with its controls, etc., is only 50 lbs. (22·7 kg.). When it is realised that the use of this propeller not only enables a much greater thrust to be obtained during take-off, but that when cruising at a speed of some 85-90 per cent. of the maximum, a very considerable improvement in fuel consumption can be effected, it will be seen that the effect of the extra weight of the mechanism is insignificant.



The Gloster Hele-Shaw Beacham Variable Pitch Propeller : Front view.

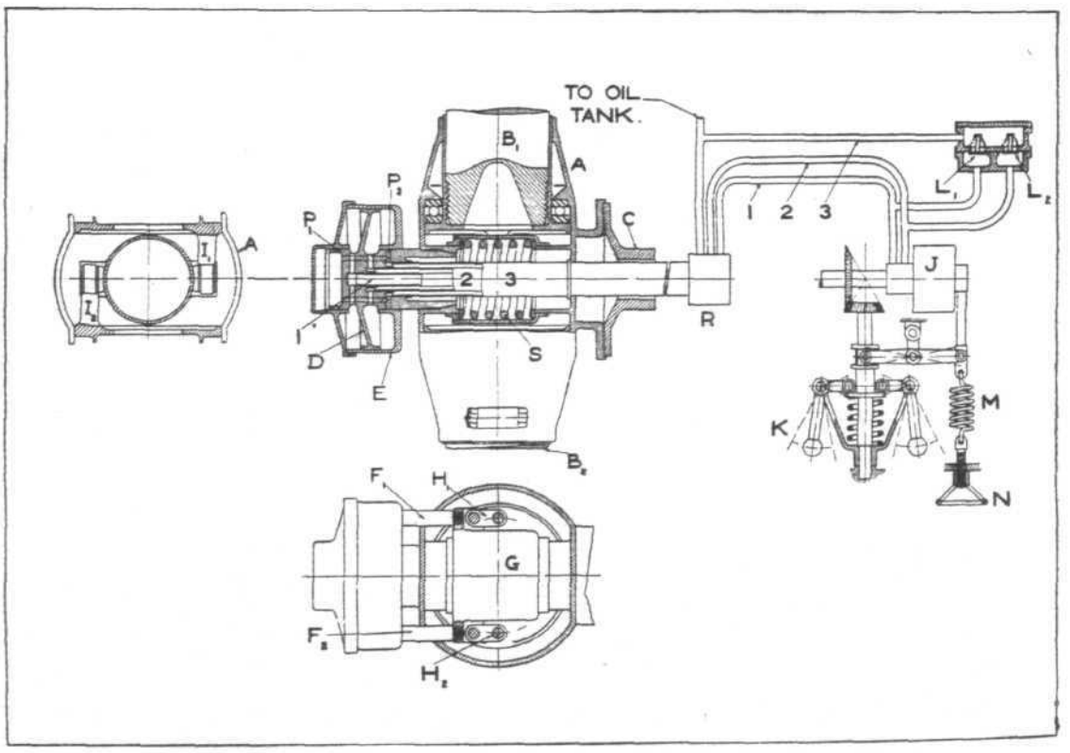
Apart from its fascination as an ingenious piece of mechanism, the Gloster Hele-Shaw Beacham variable pitch propeller is of interest on account of its *automatic* functioning. That is to say, once the small control lever is set at any particular point, the mechanism requires no further attention from the pilot, who can devote himself to other things, with the full assurance that no matter what his machine happens to be doing, climbing, flying level or diving, with throttle nearly closed or fully open, under no circumstances will his engine "race."

For instance, one may imagine the use of this variable pitch propeller on a single-seater fighter. The pilot may be engaged in a fight with another machine, and may have suddenly to dive his machine. He may easily forget to close his throttle, but if he does, the mechanism keeps the revolutions down to the figure for which the governor control was set prior to the dive. Or a pilot may, having reached a very great height, temporarily lose consciousness. Such cases are on record, and if the machine goes into a steep dive, as will often happen, an engine fitted with a fixed pitch propeller will increase its revolutions to a point when it may easily wreck itself. With the Gloster Hele-Shaw Beacham automatic variable pitch propeller this risk is eliminated.

In the case of the heavily loaded commercial aircraft or bomber, the variable pitch propeller has the advantage that the engine speed can be adjusted to give full power during the take-off, and later, when the operational height has been reached, the governor control can be set to the desired engine speed at full throttle, with consequent improvement in fuel consumption.

One might go on enumerating advantages which the variable pitch propeller appears to have, but sufficient has, perhaps, been said to show some of the more important, and a brief explanation of the principle upon which the Gloster Hele-Shaw Beacham variable pitch propeller works may be of interest.

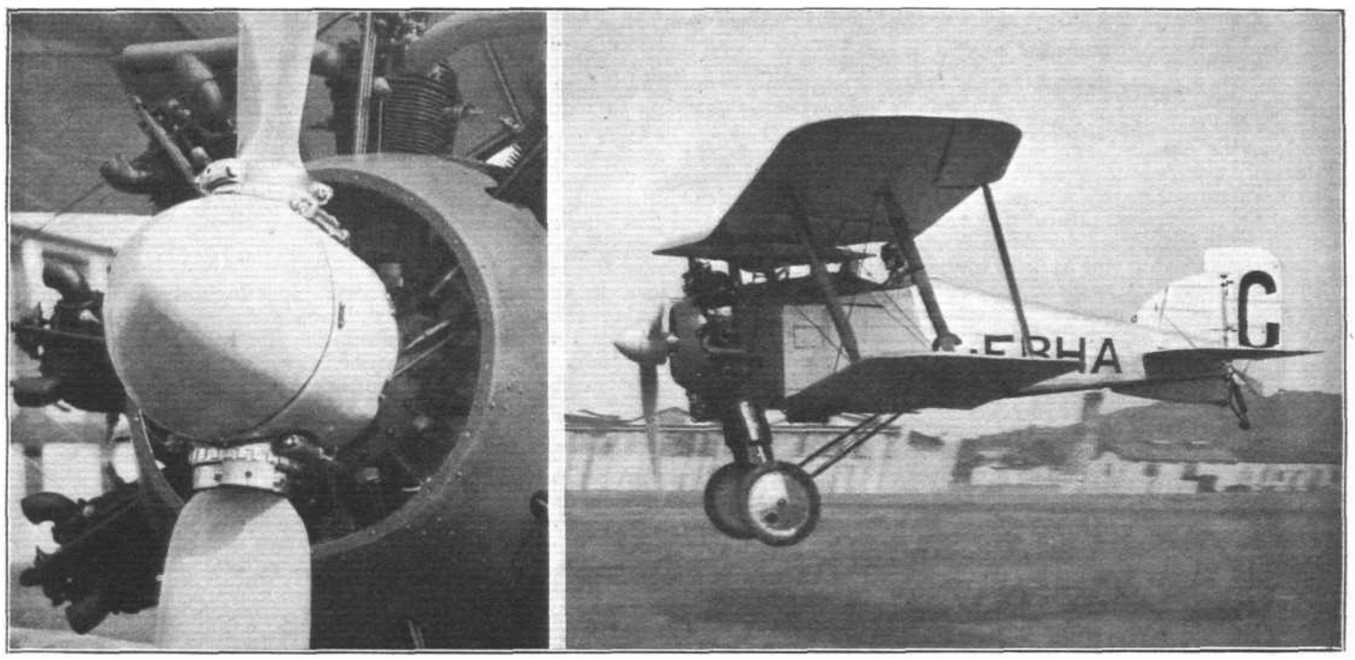
The mechanism is shown, more or less diagrammatically, in the sectional view. The propeller hub A carries two blades B_1 and B_2, which are so mounted in the hub as to be free to rotate, ball-thrust bearings being used to reduce friction. C is the propeller shaft, driven by the engine. To the front half of the hub is rigidly attached a piston D, working in a cylinder



The Gloster Hele-Shaw Beacham Variable Pitch Propeller: Diagrammatic representation of the main parts of the mechanism.

E, to which are fixed two tie rods F_1 and F_2. The other ends of the rods are screwed to a sleeve G, arranged concentrically with the propeller shaft so that it can slide fore and aft on bosses projecting from the hub. Short connecting rods H_1 and H_2 attach the sleeve G to crank pins I_1 and I_2, which are fixed to the blades of the propeller.

Running through the centre of the propeller are three oil pipes, 1, 2 and 3, of which 1 and 2 communicate with opposite



["FLIGHT" *Photographs*

THE GLOSTER HELE-SHAW BEACHAM VARIABLE PITCH PROPELLER : On the left, a "close-up" view of the hub, blade roots, &c., on a Bristol "Jupiter VI" On the right, the propeller in flight on the same engine, in a Gloster "Grebe," piloted by Flying Officer H. J. Saint.

sides of the piston D. All three pipes rotate with the propeller, a rotating oil-tight joint being provided at R.

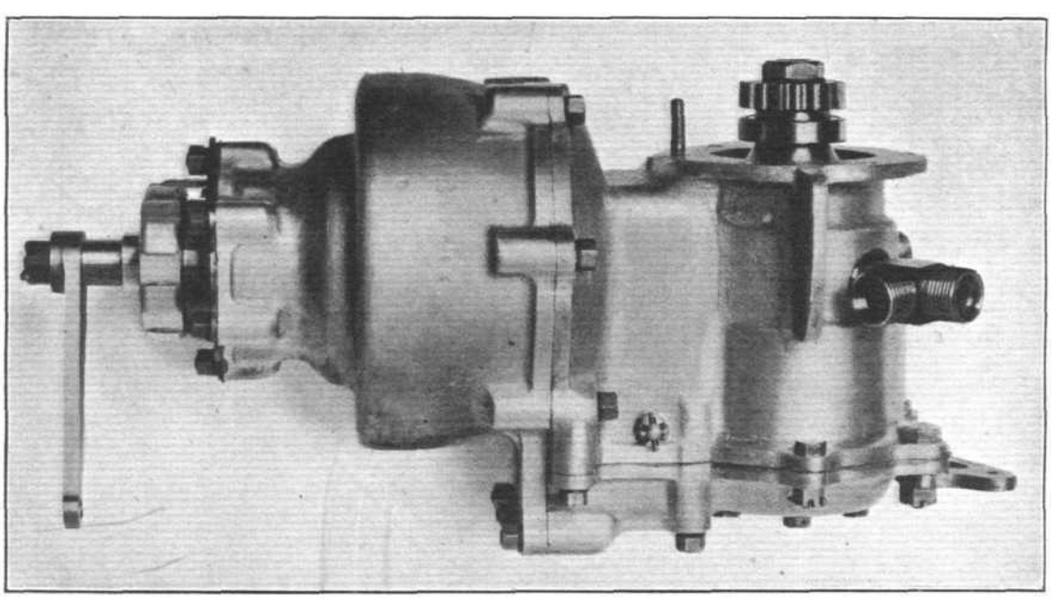
Now, suppose we supply oil under pressure to pipe No. 1. Because the piston is fixed, the cylinder E will move to the left, giving a corresponding angular movement to the propeller blades. A reverse displacement will take place if the oil pressure is supplied to pipe No. 2.

latter is running at normal speed there is no stroke, and consequently no delivery from the pump. An increase of R.P.M. will cause the governor weights to fly outwards and give stroke to the pump, causing the latter to pump oil in one direction.

A reduction of R.P.M. below the normal will reverse this flow. Pipes 1 and 2 in the hub are connected through the rotating joint R to the pump. Thus, when pipe 1 is under pressure from the pump, pipe 2 is on the suction side, and *vice versa*.

Branches from these two pipes lead to non-return valves L_1 and L_2, which make up any loss of oil due to leakage.

Let the direction of rotation of the propeller be such that a movement of cylinder E to the left will increase the pitch, then the pump is so arranged that when the governor



Pump and Governor of the Gloster Hele-Shaw Beacham Variable Pitch Propeller.

We now come to another important part of the mechanism. A variable stroke pump J and governor K are driven by the engine. A peculiarity of this pump is that at steady R.P.M., not only can the delivery be modified by varying the stroke, but the flow can be reversed if the stroke is altered sufficiently. The governor is connected through suitable links to the stroke rod of the pump, and springs controlling the governor are arranged so that when the "opens," oil is pumped into pipe No. 1, and sucked from pipe No. 2. A reduction of R.P.M. reverses this order. To provide control over the speed at which the governor will float, a spring M is incorporated in the governor mechanism. This spring being adjustable by means of a handwheel N thus determines the normal speed at which the governor will assume its mid position.

Having set the control wheel to any desired R.P.M. with

the pitch of the propeller at normal, suppose the forward speed of the machine to increase. This will involve an increase of R.P.M. of the engine and governor, which then causes oil to flow into pipe 1 and thence to the front cylinder resulting in an increase of pitch accompanied by an increase of propeller torque, and this process will continue until the R.P.M. is brought down to normal. Similarly, a reduction of forward speed causes a reduction of pitch such that normal R.P.M. is resumed. Thus, under all conditions of flight, there is only one possible R.P.M. for a given setting of the control wheel.

The maximum travel of the cylinder in either direction from the normal position is limited by suitable stops, and in the event of either of these positions being reached, very high pressures would occur in the oil system without some provision for releasing the oil. This possibility is avoided by incorporating relief ports P_1 and P_2, in the piston, which communicate with the third pipe. When the cylinder approaches its extreme position, one of these ports is opened, and the oil is permitted to circulate via pipe No. 3 through the non-return valve and back to the pump.

The possibility of a failure of the hydraulic system is remote, but should this take place, a powerful spring S, contained in the sleeve G, will return the propeller to normal pitch, irrespective of the position of the blades at the time of failure.

It will be noted that there are no glands or packings anywhere in the system, which is kept full of oil by arranging a connection between pipe 3 and an oil tank (usually the engine supply tank), any leakage which may occur being made up by a compensating amount passing one of the two non-return valves, *i.e.*, the valve which at the moment happens to be on the suction side of the pump, and any oil escaping from the system can be led back to the engine crankcase, thus ensuring that there is absolutely no waste or loss of oil due to this hydraulic circuit.

The use of oil for the hydraulic medium has one obvious advantage, in that all the working surfaces are perfectly lubricated and wear is practically eliminated.

The Flight Tests

The Gloster Hele-Shaw Beacham propeller has been tested in actual flight, fitted to a Bristol " Jupiter VI " engine in a Gloster " Grebe " machine. Owing to the fact that, with a variable pitch propeller, there are more variables, it is not yet possible to publish performance figures, but certain results and observations have already emerged.

It had been foreseen by the designers that with a governor control, any sudden change in setting would result in the speed of revolution at first " overshooting the mark," then swing a little to the other side, and so on, until the mechanism finally settled down to the predetermined speed. An estimate was made of the amount by which the revolutions would " overshoot " the desired, for instance, in suddenly opening the throttle. Actual flying tests have demonstrated that this does occur, but that even with the most sudden change in control setting which it is possible to effect, the speed settles down to the desired in something like two seconds. For a reasonably gradual advance of the lever, such as a pilot would normally use, the response of the governor is practically instantaneous.

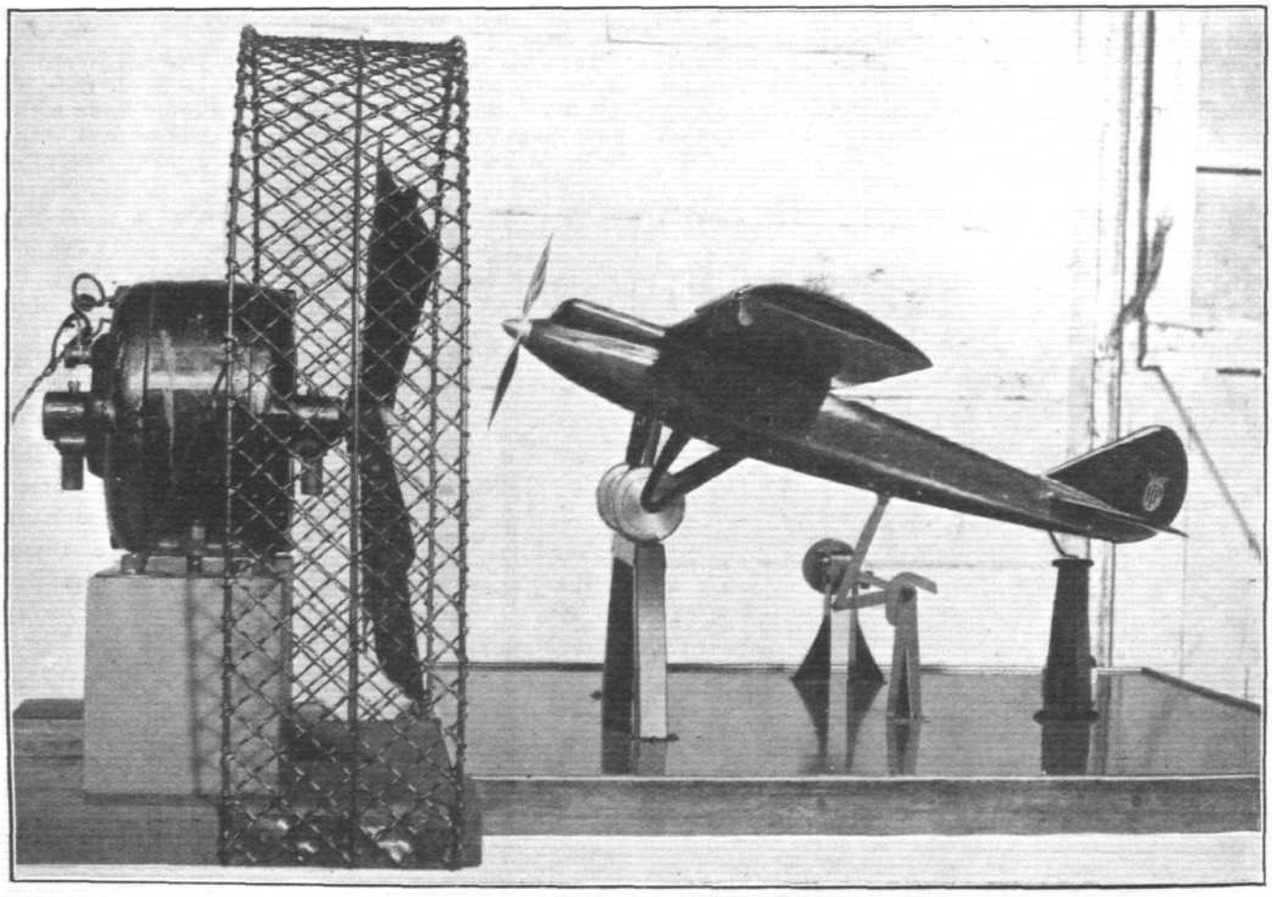
Among the things observed during test flights were the following: With the pitch set to give the maximum permissible engine r.p.m. (1,850) climbs were carried out, at round about the 19,000 ft. (5,800 m.) level, followed by a dive to the terminal velocity. In the case of level flight and climbs, the r.p.m. remained absolutely constant, and during the dive they advanced approximately 20 r.p.m. and then returned to within 10 r.p.m. of the previous reading. This dive, it might be mentioned, was continued for some 6,000 ft., and with the throttle in the fully-open position.

During a loop with constant throttle, the engine speed did not vary by more than about 20 r.p.m., and at the end of the loop the r.p.m. were the same as at the beginning.

An increased rate of climb was observed, but owing to the fact that with a variable pitch propeller, it is possible, within limits, to fly, for a given airspeed and with fixed throttle, at any r.p.m., it is likely that even better results will be obtained once the best combination of r.p.m. and airspeed has been found. At any rate, the Gloster Hele-Shaw Beacham variable pitch propeller has now been proved a most promising mechanism, and doubtless much will be heard of it in the future.

HANDLEY PAGE, LTD.

THIS pioneer British aircraft constructing firm is not exhibiting a complete machine, but their exhibit, while



THE SLOTTED WING AT BERLIN : The action of the Handley-Page slotted wing device is demonstrated very effectively by the model shown above. In front of the model, which is fitted with a miniature slotted wing, is an electric fan, producing an air current past the model. The latter can be inclined through varying angles of incidence until the stalling angle is reached, when the slots automatically open.

not perhaps occupying as much space as would a Handley Page multi-engined air liner, is none the less interesting. In fact, we venture to say that it will form one of the attractions of the show. Their exhibit deals entirely with the Handley Page "slot" device, which is shown, first by a complete (full-size) D.H. "Moth" wing fitted with the slots; secondly, by a working model; and, finally, by a selection of large photographs of aircraft fitted with this device.

The Handley Page "slot" is undoubtedly the most important invention that has so far been contributed to the modern development of aeronautics, and even though it has now reached the practical stage, its application and further development will most certainly make still more progress in the future. We assume the nature of this device is sufficiently well known to our readers to render unnecessary any technical description of it here. To those—should there be any—who are ignorant as to what the Handley Page slot is, we may briefly sum up its action as follows. It consists of a small auxiliary surface, disposed along and parallel to the leading edge of the wing, or control surface, somewhat after the fashion of a slat of a Venetian blind. This slat can be opened or closed, so that, in the former case, a slot or gap is formed between it and the aerofoil proper, or, when closed, lies flush against it. The employment of the slot has been found to give not only increased lift, but to render the aerofoil stable at high angles of incidence—above its normal stalling angle.

As a result, a machine so fitted maintains its stability, and is under full control when flying below its normal stalling speed. The value of this, as regards safety in flying, is, of course, obvious, for it not only safeguards the pilot against the serious consequences of getting the machine beyond the stalling angle or speed, but it enables a machine to take off from, or alight in, extremely restricted areas.

At the Berlin show the action of the automatic slot gear is effectively demonstrated by a model of an aeroplane, fitted with slotted wings, which is placed in front of an electric fan supplying a flow of air past the model. By increasing the angle of the machine until the stalling angle is reached, the slots may be observed to open automatically, and close again when the model is brought back to normal flying trim. The practical application and construction, etc., of the slots can be examined by means of the slotted "Moth" wing.

The Handley Page slot is now being fitted to a number of aircraft, with complete success, and a few examples of these are shown by a collection of large photographs.

HENRY HUGHES & SON, LTD.

WE feel somewhat at a loss to know where to begin in describing the exhibit of the old-established instrument firm of Henry Hughes and Son, Ltd., of 59, Fenchurch Street, London, E.C.3. On their stand, No. 56 in Hall II, is a very comprehensive range of aeronautical instruments. It is, of course, impossible on this occasion for us to describe each instrument in detail, and we are afraid we must content ourselves with just a list of these with brief remarks on the main features concerning some—even this consumes much of the limited space available in this present issue.

Perhaps the most important instruments comprise the Aperiodic compasses for use on aircraft. These include the following models, suitable for every type of aircraft:—

6/18 *Mk. III.*—The latest pattern of the original type of Aperiodic compass.

Mk. III A.—Smaller model of the above with latest type of suspension; particularly adapted for use in modern light aeroplanes.

P. 2.—Pilot's compass, without radium; this type has been used by Sir Alan Cobham on his flights to South Africa and Australia. (For large machines.)

P. 4.—Pilot's compass with black interior and radium illumination; designed on the same principles as the *P.*2. (For large machines.)

*O.*2.—Observer's compass fitted with sight for taking bearings, but without radium.

*O.*3.—Observer's compass fitted with sight for taking bearings, with black interior and radium illumination. (Fig. 1, p. 886).

*P.*3.—Pilot's compass for small fighting aircraft. (Fig. 2.)

*S.O.*2.—Special type of Aperiodic compass with sight, preferred by Marquis de Pinedo, and used by him and other Italian world flyers. (Fig. 5.)

253 *A.C.*—A special type of pilot's compass, using a scale covering 100° in conjunction with a special system of filament pointers enabling the pilot to read the compass to 1° from 0° to 360°. (Fig. 4.)

Among the "Dead Beat" compasses may be mentioned the following:—

259 *A.*—Large and small patterns with circular vertical strip card and damping filaments.

5/27 *A.*—A small compass for light aeroplanes; fitted with dome glass giving a magnified image of the compass card when placed at eye-level.

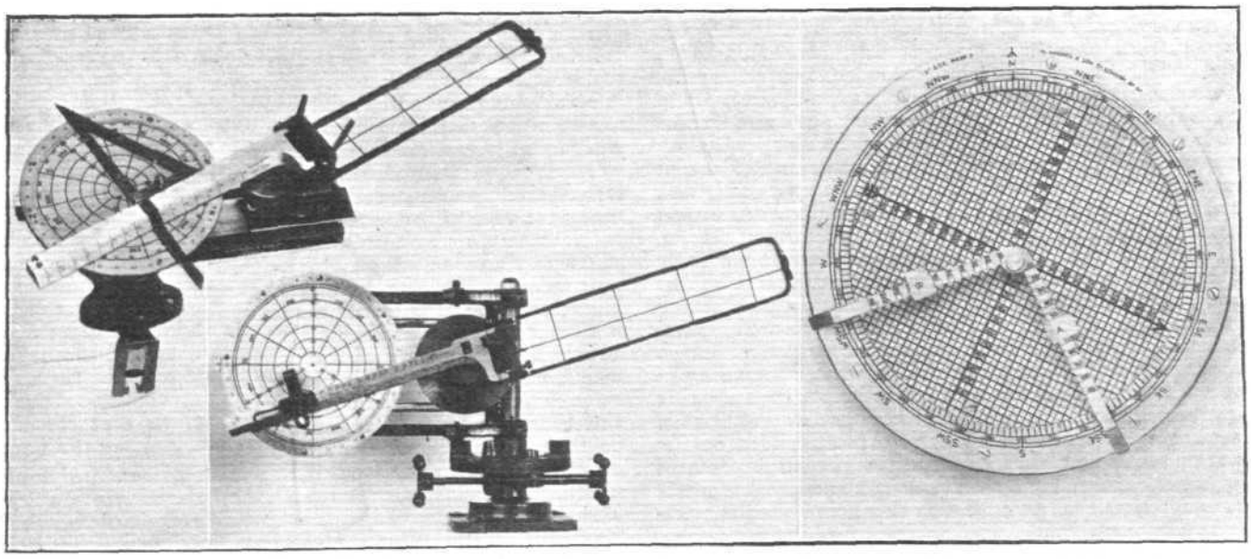
253 *D.B. Dome.*—A special compass of normal size having a very narrow horizontal strip card and fitted with dome glass giving eye-level readings.

Airship Compass.—This compass has been specially designed for the navigation of large airships. It has a special azimuth sight designed to facilitate the accurate determination of bearings even when the airship is unsteady in its movements. (Fig. 3.)

Other special compasses for aerial purposes are the 254, suitable for the determination of bearings when held in the hand, and the *Medium Landing Compass*, a dead-beat compass with prismatic sight, suitable for rough survey work and also for use on temporary aerodromes in laying out bearings for the correction of compasses mounted in aeroplanes.

Then we have a variety of other aero navigating instruments, such as wind gauge bearing plates.

When any aircraft is in flight, three vectors are always present; these are the direction and speed of the aircraft through the air, the direction and speed of the wind and the resultant vector, the direction and speed of the aircraft relative to the earth. By the use of these instruments the unknown vectors are readily deduced from those that are



HUGHES AERO NAVIGATING INSTRUMENTS AT BERLIN: On the left the Mark II and Mark II A Wind-gauge Bearing Plates, and on the right the Course and Distance Calculator

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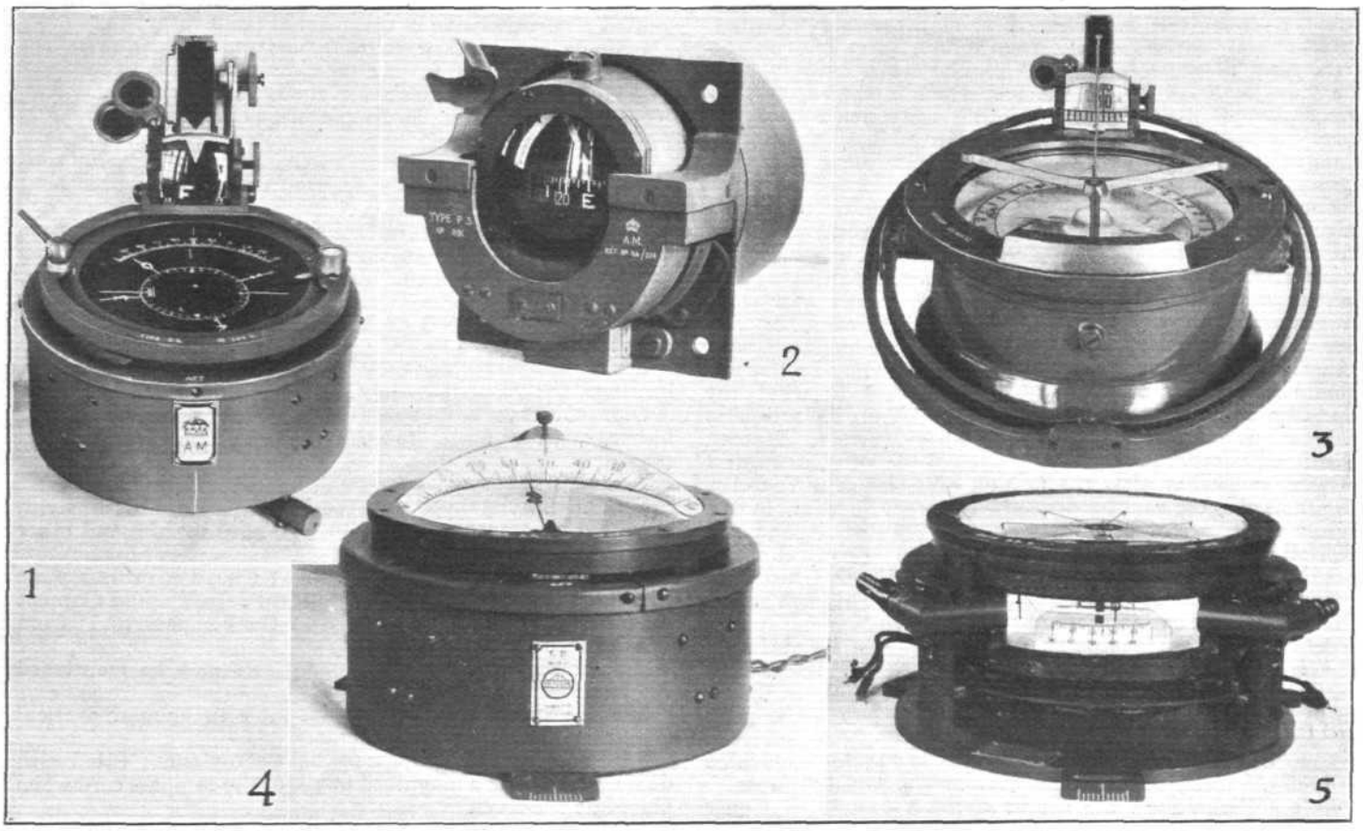


SOME HUGHES AERO COMPASSES AT BERLIN : (1) The "O.3" Observer's. (2) "P.3" Pilot's. (3) Airship. (4) "253.A.C." Pilot's. (5) "S.O.2" Aperiodic, as used by Marquis di Pinedo.

known, and the same instrument is used for the observations and the necessary calculations.

In the Mark II and Mark II A (both of which we illustrate), observations are taken over the side of the aircraft, but in the periscopic type the observer may be completely sheltered from the weather, and this type is particularly useful in flying boats or totally enclosed aircraft.

Several types of bubble sextants are also shown, including types used on successful world flights, as well as two specimens of the Wimperis bombsight as used by the British Air Force.

Finally, two calculating instruments, the Bygrave position line slide rule and large and small course and distance calculators, complete the exhibits with following miscellaneous instruments :—Douglas protractor, power spotter for artillery fire, Jessen chart holder, height computer, air speed computer, model of earth inductor compass, model of Husun rangefinder, etc.

THE IRVING AIR CHUTE CO. (GT. BRITAIN), LTD.

AMONG the parachute exhibits at the Berlin Exhibition is the well-known Irvin parachute. It is used in twenty-seven countries. The latter includes England, America, Spain, Japan, Sweden, Denmark, Finland, Brazil, Holland, Chili, Canada, Dutch East Indies and Germany In Poland, three lives have already been saved with the Irvin. Germany orders small numbers at a time. For all countries except England the orders are produced by the Irving Air Chute Co., Ltd., of Buffalo, N.Y., U.S.A., where fifty a week are turned out. In England, the Irving works at Letchworth, Herts, produce thirty-five a week entirely for our Royal Air Force in which the parachute is standard equipment, as it is in the American Army and Navy Air Services.

Mr. Irvin, who personally controls the Letchworth works, and who is the only person there not a Britisher, was a parachute exhibition jumper in America at the beginning of his career. With the general type of parachute then existing he made jumps at San Francisco as far back as 1912, when he was known as Ski-High Irvin. He is stated to be the first airman on record to have made a parachute descent from an aeroplane with a "Free Type," "Manually Operated" parachute. He has made over 100 descents with his parachutes.

In the latter part of the war the United States Air Services appointed a Board of Aeronautical Engineers to study parachutes and eventually, in 1919, the Irvin type, which was already widely known in America, was adopted as standard equipment. One respect in which it differs in design from some other parachutes, is the attachment of the small pilot parachute which springs out sharply when the rip cord ring is pulled during descent and pulls the large canopy out. But it is by no means necessary for safe functioning. The Irvin will open just as well without its pilot chute, which can be described as a sort of extra safety device. When the question as to its necessity was raised in America, the U.S.A. Air Services decided that if it was not absolutely essential it certainly did no harm and they decided definitely that it should remain.

It speeds the opening of the parachute rather than retards it and thereby allows for safe jumps from very low altitudes. It so happens that of the 130 lives saved by Irvin parachutes up to date, the jumps were nearly all made at extremely low altitudes. There have been over 8,000 live jumps without failure, one of which was a record of 24,406 ft., made by Capt. Stevens, U.S. Army Air Service. On the four occasions that Col. C. Lindbergh saved his life he had an Irvin parachute. Capt. E. R. C. Scholefield, Chief Test Pilot for Messrs. Vickers, Ltd., descended safely with one on July 1, 1927, at Brooklands, when he was obliged to jump from the machine he was flying.

The manufacture of parachutes does not call for greatly skilled labour ; it demands rather extreme care and caution. Although the material supplied to the Irving works at Letchworth is manufactured to the specification ordered, nevertheless (though purely for the sake of extra caution), it is all tested again before use. There are testing machines for each material. The tensile strength of the harness and silk are tested and even the thread is tested. The silk is also weighed, for the total weight of the parachute is an important factor, as in all aircraft equipment.

The Irvin type weighs 18 lbs. A device is necessary to ensure that the silken shroud lines attached to the canopy, which have a certain amount of elasticity, are cut to the same length. Their tensile strength is 400 lbs. That of the webbing harness is 3,000 lbs., and that of the metal parts such as the snaps and buckles for securing the harness on the wearer, 5,000 lbs. The latter are made of chrome nickel steel, and are either galvanised or cadium plated. The pilot chute is 30 in. in diameter and constructed with steel ribs and a spring. It folds under tension and is thus packed folded in the container. It is attached to the peak of the parachute with a silk cord of the same tensile strength as the shroud lines.

The Japanese silk which is the only material in the making

of the parachute at Letchworth not of British manufacture, is cut in sections and these are sewn together on special Singer sewing machines, operated by girls, to form the canopy. This cutting is done by a small cutter held by hand and driven by a small electric motor, and sufficient sections are cut at one time to make many parachutes. Incidentally, every machine in the works, including even every one of the sewing machines, has its own electric motor. Each worker switches on and off the attached motor as required, without affecting the other machines. There is one ingenious little machine there which sews an eyelet to canvas with thread, ties a knot and breaks the thread—all in the fraction of a second.

The type produced for general use is 24 ft. in diameter, and other types are 28 ft. and 22 ft. respectively; for exhibition and training jumps. The first type is adapted to the usual containers, known as the seat, lap and back packs.

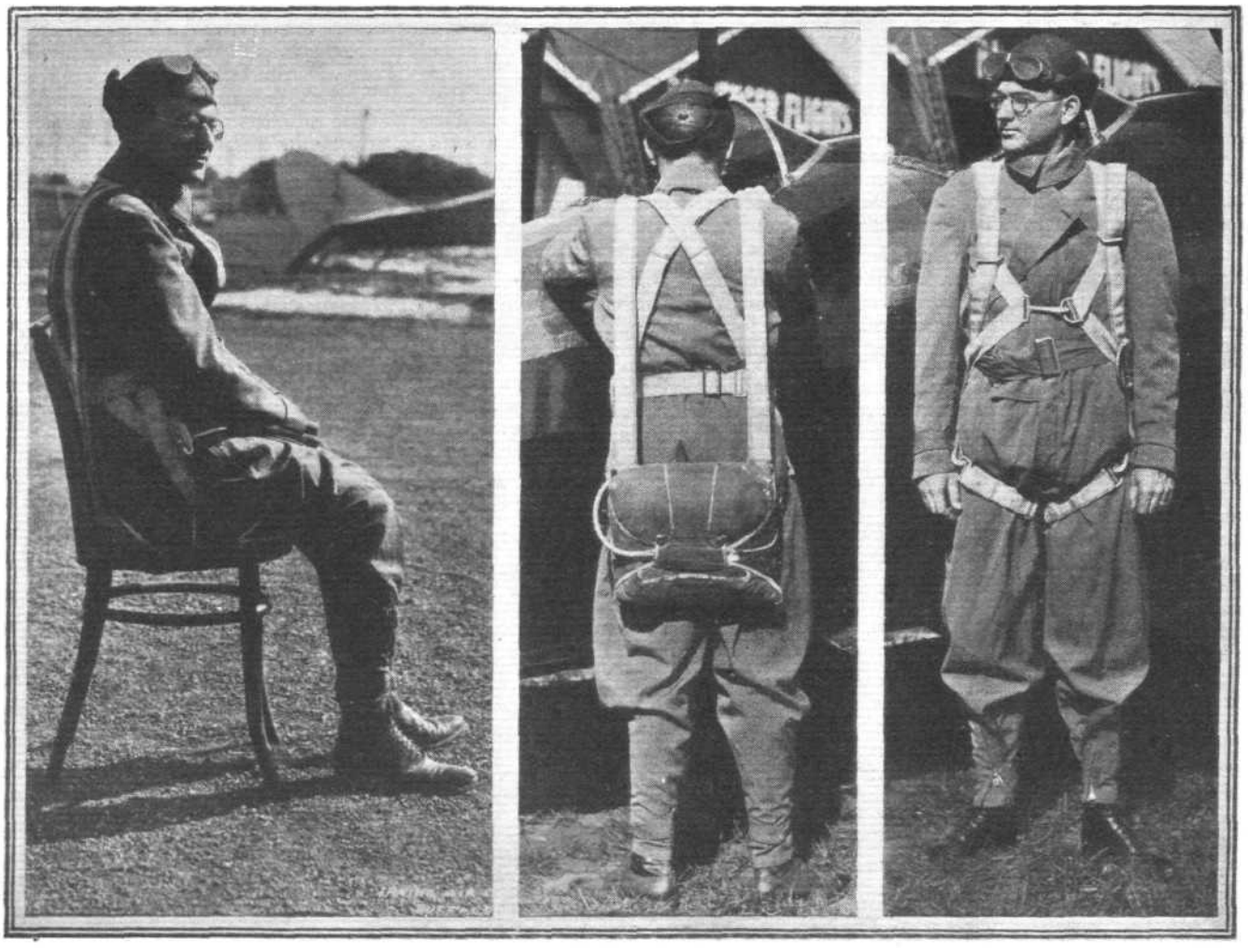
Average rate of descent is 16 ft. per second and the average time required for opening after the rip cord has been pulled is approximately 1 second. The Irvin parachute withstands a shock of 600 lb. load when released at 100 m.p.h., and a 200 lb. load when released with a time fuse after attaining a speed of 400 m.p.h. It is of the free type, that is, there are no attachments of any nature to the machine. A jumper with an Irvin parachute has the usual control of his descent. If a collision with an obstruction is threatened he can change the gliding angle by side slipping, which is done by grasping some of the shroud lines on the side facing the desired direction and pulling the edge of the parachute down 3 or 4 ft., this resulting in air being spilled from under the higher side of the canopy and means a material increase in the angle of glide to the lower side. As the rate of descent is increased while side slipping it should not be attempted close to the ground except in an emergency. Although not absolutely necessary, it is well to face the direction of drift, as a better landing can be made. For this position a handful of shroud lines are again pulled to bring the edge down about 3 ft. in the direction it is wished to turn, then other shroud lines are grasped on the opposite side and given a vigorous twist or swing in the direction it is wished to turn without pulling down on them, however. That combined operation spins the parachute round.

If there is any tendency to oscillate during descent, it can be checked by pulling down hard on the shroud lines on the high side of the parachute as the body swings in that direction. The moment the body starts on the return swing, the lines are released on the one side and the swing is met by pulling down on the opposite lines as the body comes up on that side.

When near the ground and preparing for a landing, a sitting position in the harness is retained, but with the knees lower than the hips and muscles relaxed. Lift webs over the head are grasped and on the instant of contact with earth and before the parachute can collapse the body is lifted briskly by pulling on the lift webs. That action greatly helps to absorb the landing shock. Nothing is gained by merely lifting the body before the feet touch as the impact is merely delayed and not lessened. In the event of an inevitable descent in water the jumper settles well back in the harness and unsnaps the leg straps, and when close to the water the breast snaps are undone and the arms taken out of the shoulder straps. At 3 or 4 ft. above the water the whole harness is released and a free fall made. The moment the weight is thus taken off the parachute it will drift off with the wind.

For landings in strong winds the same procedure is followed except that the feet touch the ground before the harness is released altogether. The parachute itself can be collapsed in a strong wind by pulling some shroud lines 8 or 10 ft. towards the body, which spills the air.

When the Irvin parachute is in constant service, it should be shaken out and repacked at least once a month, and, of course, it should never come in contact with acids, oils and similar substances. Dust and ground stains will perhaps be accumulated in repacking and in making descents, but that does not affect it; none the less care should be taken to keep the silk fabric and cordage clean. Washing is not recommended, and ordinary soiled spots and stains of a



IRVIN PARACHUTES: These three views of Mr. Irvin wearing the Irvin parachute (seat pack) reveal the harness arrangement. The rip-cord ring will be seen on his side in the right picture. This is one of the Irvin types used in the Royal Air Force.

harmless nature should be left alone. Marks of an injurious substance should be removed with carbon tetrachloride or a similar solvent that will not injure fabric. If the parachute has dropped in water, it should be rinsed with clean fresh water and dried as soon as possible. If it has suffered many immersions, tests with a dummy should be made to determine whether deterioration has set in.

Packing, even for the inexperienced private user, is comparatively simple and quite safe, if the directions given are followed. Mr. Irvin has no fear of the consequences of anyone's packing as long as the shroud lines are kept straight.

The price of the Irvin air chute is £70. That is the silk type. Cotton types are not manufactured.

BRITISH RUSSELL PARACHUTE CO., LTD.

THIS parachute company is exhibiting its British Russell "Lobe" types, which they manufacture in this country; the silk seat pack, complete with all fittings, harness, webbing and equipment; also, the silk back pack and cotton seat pack. These are representative types, but the manufacturers supply parachutes for instructional purposes, large ones for exhibitions, and also an enormous one, 65 ft. in diameter, for bringing down aircraft safely.

The designer of the "Lobe" parachute was Mr. J. M. Russell, the Russell Parachute Company's engineer, who was employed by the U.S. Army Air Service Engineering Division as parachute engineer during the developments carried out for their Government from 1919 to 1924.

The Design

Primarily, it was designed for military purposes, the manufacturers state, and the lobe canopy, which is the distinctive feature, gives rapid opening under fouled conditions, besides a rapid opening without excessive shock load, maximum skirt extension under all air and load conditions, and automatic compensation for load within body weight limits, assuring safe descent for abnormally slight and heavy persons.

Also, other claims are that oscillation or swinging is reduced to a minimum, assuring safety on landing; ease of control during descent with means provided for partial collapsing and hastening of descent, which decreases drift and allows for avoiding danger from above. Finally, this parachute is said to operate safely at 100 ft.; give an excellent performance when packed by inexperienced people; is 100 per cent. manually operated, and may be safely used by those inexperienced at parachuting.

The company produces both silk and cotton parachutes, and conforms to the United States Government specifications. Their silk fabric is specially woven of imported material of high tensile strength and light weight. The cords, of which there are twenty-four to each parachute, are woven of high quality silk, each having a tensile strength of 400 lb. It is said that they do not exhibit picked threads after usage.

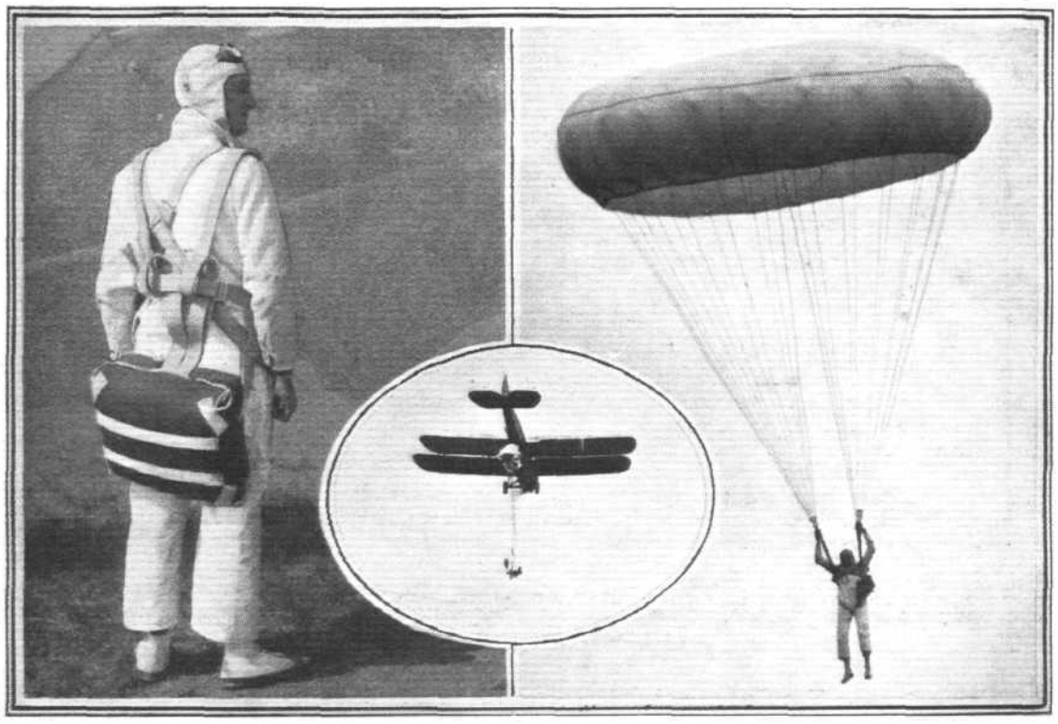
The silk type is recommended by the company for use with any class of aircraft and particularly for machines with high speed performance where severe usage is demanded. With the cotton type, the material is of light weight, yet with a high tensile strength and specially woven to meet the official conditions. A 250-lb. tensile strength is credited the silk cord used with the cotton parachute, and it is durable. The latter is recommended with slower types of aeroplanes, such as those used for bombing, photography, observation, training, and commercial purposes.

In America the prices quoted for the Russell products are 350 dollars for the silk type and 250 dollars for the cotton type, each complete with carrying bag.

Unless otherwise ordered, the seat pack type is always furnished. Back packs and special packs are manufactured to meet special conditions. Each sort is entirely manually operated, a jerk on a large release ring freeing the parachute and also ejecting it from the pack. There are no elastics, springs or pilot parachutes involved.

Packs are made of 12-oz. double-fill O.D. duck, with ·080 music wire pins. Joints are wrapped, soldered and tested, and the rip cord rings are made of seamless steel tubing, cadmium plated, and are 4 in. in diameter. Ring and rip cord are so arranged that it is practically impossible to rip the pack other than by actually manually pulling the ring after it has been removed from its pocket.

The harness can be worn loosely and comfortably whilst flying, as it automatically tightens when the wearer stands. It is made of woven 3-ply linen web having a tensile strength of 2,750 lb. All hardware is dropped forged, nickel steel, cadmium plated to prevent rust, and is stated to be tested to 2,500-lb. load before used in construction. Total weight of the Russell "Lobe" parachute, harness and pack is 19 lb.



The British Russell "Lobe" parachute, as worn in the seat type, and in descent, which is comparatively free from oscillation, owing to the particular shape of canopy. The quick opening is revealed in the view of the demonstrator leaving the machine. This type of parachute is now being manufactured in England, and is being exhibited at the Berlin Aero Show

["FLIGHT" *Photographs*

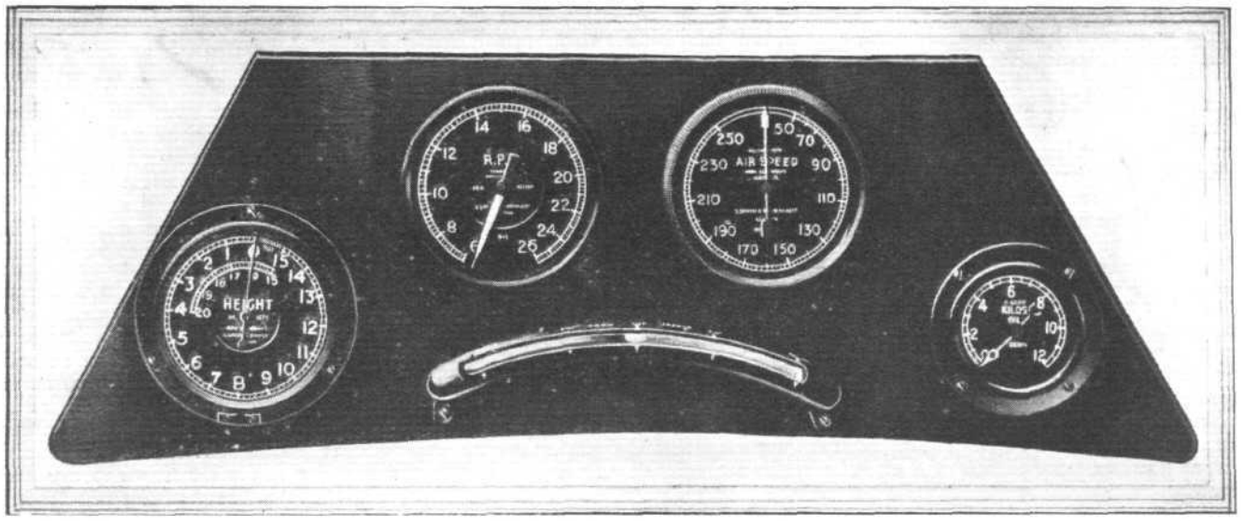
Instructions for Descent

For descent in this parachute the wearer must make sure that the leg strap snaps and breast strap snap are fastened and the rip cord ring is in the pocket on the harness. The ring must not be pulled until one is clear of the machine and the pull should be vigorous, although a 10-lb. pull is all that is actually required. Perfect function occurs with a steady pull, but vigour insures maximum speed of operation. During the descent, to change the direction or lessen the drift one or more of the lift webs on the side facing the desired direction should be pulled.

On making contact with land the knees should be bent under, and the cords to the centre of the canopy pulled to collapse it.

Packing and Maintenance

Repeated packing is not necessary, apparently, Russell parachutes used constantly for 90 days have been found efficient for an emergency. Inspection and repacking is recommended every 60 days. Inexperienced persons may correctly repack by stretching the parachute, shroud lines



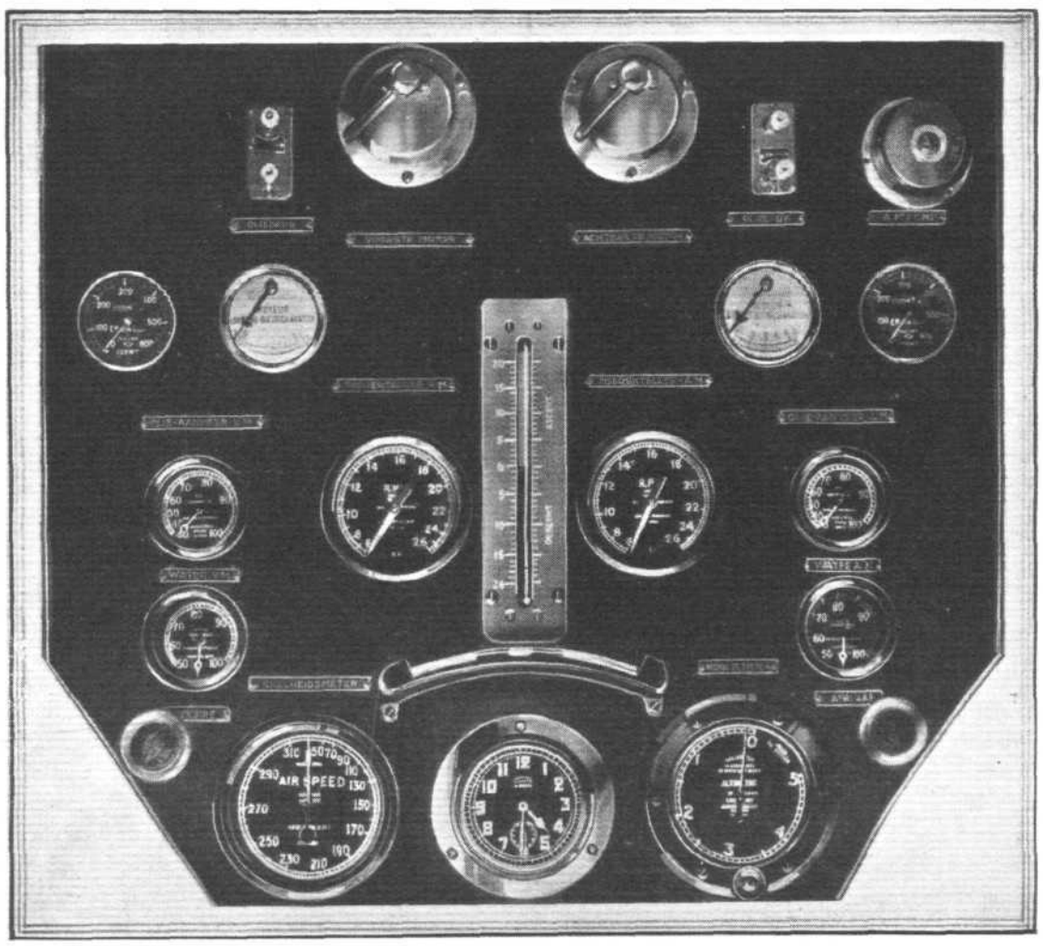
SOME OF "SMITH'S" AERO INSTRUMENTS: A neat instrument board for a light 'plane.

and harness on a table at full length in such a position that the harness is back up for the seat pack type, or front up for the back pack type of parachute. The cords must not be twisted through the harness. The two groups of cords close to the bottom of the parachute skirt are grasped and, by one standing on a table, the parachute is thoroughly shaken, causing the fabric to assume its natural fold or position. Next it is replaced on the table with all lines straight, and the bottom folded in pleats from either side into a bundle slightly larger than the width of the parachute pack, with cords to the centre. Then pack frame is folded back upon the harness so that the edge is within one foot of the rings to which cords are tied. Webbing is folded back, over pack frame and fastened with the provided strap.

The entire group of cords are then folded backwards and forwards across the pack frame and the latter and harness moved towards the canopy until all cords are in place, then flaps and straps provided are fastened over the cords. The pack frame is placed with narrow end towards canopy and parachute folded in pleats upon it. The entire assembly is inverted and by kneeling on the pack frame, the cover is fastened in position. Snapping a detachable cushion on the pack frame and placing the release ring in its pocket, and the parachute is then ready for use.

S. SMITH AND SONS (M.A.), LTD.

"SMITH" Aero Instruments of world fame are not only to be seen on Stand 55 of "Deco" G.m.b.h., Berlin (the German Agents of S. Smith and Sons (M.A.), Ltd.), but they are also to be found *in situ* on many of the machines in the show. Their exhibit, as the late "Little Tich" expressed it, is not large, but what there is of it is *good*! It comprises four



"Smith's" Aero Instruments at Berlin: One of the dash-boards (such as would be fitted to a large commercial machine), exhibited by S. Smith and Sons (M.A.), Ltd., showing a range of their well-known aero instruments.

" showboards "—(*a*) A dashboard, such as would be fitted to a large commercial machine, showing a complete range of " Smith " Aero Instruments. (*b*) A smaller instrument board suitable for a light 'plane. (*c*) Two shields showing a range of " K.L.G." ignition plugs. Some Aperiodic compasses are also shown.

The instruments shown on the large dashboard include the following :—Two type Av. 508 revolution indicators, of the small square flange type, with flexible drive. Two type AA. 437 oil thermometers and two AA. 437 water thermometers. One type AA. 725 cross level, or lateral clinometer. One type AA. 541 air speed indicator. One type Av. 563 altimeter. Type AA. 731 fore and aft level (longitudinal clinometer). Regarding the revolution indicators, it may be of interest to note that these have been fitted in a Dornier Wal flying-boat by Aviolanda Papendrecht of Holland, in place of indicators of the electrical type. They have proved entirely satisfactory, in spite of the long flexible drive (8·2 m. and 9·2 m.), which functions faultlessly—Capt. Courtney's Atlantic Dornier was so fitted and the Av. 508 revolution indicators have given 50 hrs.' service without the slightest trouble.

The light 'plane instrument dash includes the following instruments : reading from left to right in our illustration : Type Av. 572 altimeter (dial diameter, 3 in. ; weight, $11\frac{3}{4}$ ozs.). Type Av. 508 revolution indicator (dial diameter, $3\frac{9}{16}$ in. ; weight, 28 ozs.). Type Av. 546 air speed indicator (dial diameter, $3\frac{9}{16}$ in. ; weight, 16 ozs.). Type AA. 407 oil pressure gauge (diameter, 2 in. ; weight, $8\frac{1}{4}$ ozs.). At bottom, Type AA 725 cross level (weight, $3\frac{1}{2}$ ozs.).

" Smith's " aero instruments are not unknown in Germany, for a number have, from time to time, been supplied to various firms. They have a world-wide reputation for efficiency and reliability, and S. Smith and Sons are constantly experimenting with new types at their Cricklewood works. For instance, they have recently produced two interesting instruments—an air speed indicator which registers to 400 m.p.h., and a revolution indicator which registers up to 4,500 r.p.m.

" K.L.G." plugs—of which a full range is exhibited—need no other reference here other than they are being supplied to several leading German air companies, including Deutsche Luft Hansa, A.G., Junkers-Flugzeugwerk, A.G., and to the makers of the " B.M.W." engine.

Imperial Airways, Ltd.—The exhibits of Imperial Airways have not been placed to great advantage at the exhibition, being separated from the rest of the British section and from the main hall by high partitions. Then their exhibits are not up to the standard expected. They have an Argosy fuselage " mock-up " and models, booklets and statistics, etc. The Armstrong-Whitworth " Argosy " is the large cabin air liner used extensively by Imperial Airways. It is fitted with three Armstrong-Siddeley " Jaguar " 385-425 h.p. air-cooled engines. It carries 20 passengers, crew, and luggage, has a cruising speed of 95 m.p.h., top speed near ground of 109 m.p.h., a range in still air of 340 miles, and a ceiling with full load of 11,000 ft. Wing span is 90 ft., length 64 ft. 6 in., and height 19 ft. Wing loading is 9·5 lb. per sq. ft. and power loading 15 lb. per h.p. Maximum loaded weight is 18,000 lb. and paying load 4,500 lb. The " Argosies " have given great satisfaction on our London-Continental air lines during their long service.

The Palmer Tyre, Ltd.—There is a complete range of Palmer wheels and tyres, and also a quite new wheel brake for aircraft, pneumatically operated. Palmer wheels and tyres have played a notable part in the history of aviation. During his recent flight to India Capt. C. D. Barnard had his Fokker monoplane standing in the heat of the Persian Gulf for two months, and despite this and eight take-offs and one forced landing with the tremendous load, the Palmer tyres were in such perfect condition at Karachi that it was decided to discard the spare wheel for the fast return flight, which had been untouched since the start from England.

C. C. Wakefield and Co., Ltd.—Castrol is a household word wherever aviation or motoring is followed. It has played its important part in innumerable historical flights. It is used the world over, and has been for a decade. C. C. Wakefield and Co., Ltd., are exhibitors at Berlin with their products.

I.L.A. FROM ABOVE

FLIGHT

PRIVATE FLYING

A Section of FLIGHT in the Interests of the Private Owner, Owner-Pilot, and Club Member

"OBJECT OF FLIGHT"

By IVOR McCLURE

[*Our contributor, Mr. I. McClure, again adopts his original style of narrating a recent private air tour through Europe in his D.H. "Moth" (Cirrus Mk. II).*—ED.]

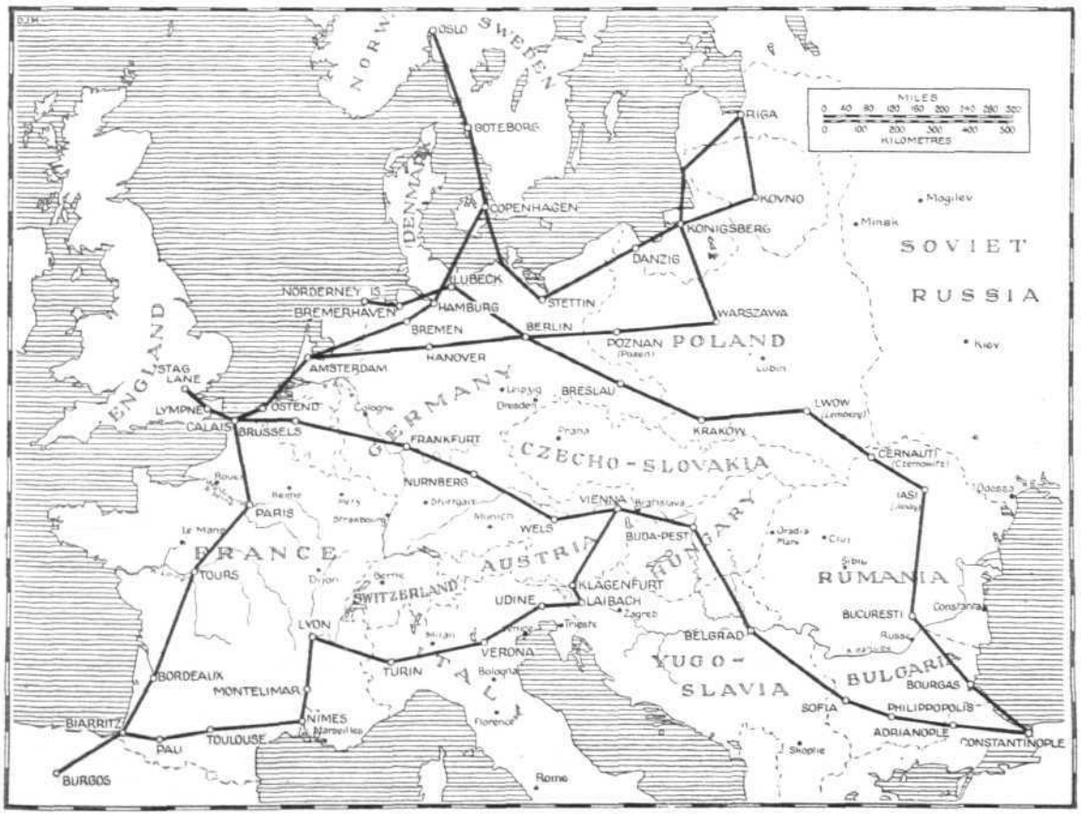
MATERIAL progress being far ahead of mental progress, it is still necessary to get permission to fly to certain European countries. Their Governments will let you walk there, if your own feet will or you may be dragged there in a steel box full of cinders if you have a railway ticket. It is only when you forsake anachronism, discomfort and extreme danger and wish to fly in your own aeroplane that you are regarded as being faintly awesome and requiring control. There is now no longer any just cause for complaint about this for all the old bothersome formalities can be done for you: that is to say, you can fill up one long form instead of a multitude of short ones. But you still have to say what is the "Object of Flight"; ignoring all possible deviations from the truth you say "Pleasure." You are not on oath and that is what it should be. Indeed, you may be lucky.

There are still a few things to rectify before that word "Pleasure" can be written without a grim, cynical smile. Brains of immense power, research laboratories, vast factories are working to increase the speed of aeroplanes by some split seconds; at the very first aerodrome you land for petrol you lose whole hours. The petrol is never near the hangars where it might possibly be required. Two square little men march briskly off into the landscape and they bring the liquid back in cans and cannisters, jugs, pots, bowls and billikens; it is even money on a cup or a cistern. There is the clambering all over the machine to fill up. On what kind of car do you have to stand balanced on the radiator cap to fill up with petrol? We are not quite out of the barbaric age of aviation. The tortures of payment are sadistic in their devising, falling as they do on victims chafed raw with small delays.

At Hamburg, where the new aerodrome buildings will make Wembley Stadium look like a week-end cottage, three-sixteenths of the housing fee has to be paid to one authority, one-thirtysecond of the landing fee to another, seven-tenths of the petrol to a third and Hangar B, where the machine is, stands three-quarters of a mile from Hangar A where the offices are. There is a very nice man at Bremen who has a sense of humour. Having kept us waiting 20 minutes getting small change for 1 mark (and I had given him a 50 mark note so I couldn't afford to waive the change for that) he saw us off to Hamburg for the night and then wirelessed Copenhagen to expect us. At Copenhagen the aerodrome officials, their stenographers and clerks, the customs and the passport men and petrol-pump-Bill sat up all night playing Nap by the light of the flood lights waiting for us to arrive to pay their expenses and overtime. Which we did, next day.

It would be discourteous and unjust not to mention Kovno. All our fuel arrangements went astray there, which is easily explained by one glimpse of Kovno. It was, however, the only aerodrome where Vacuum Oil supplies were not awaiting us, a fine achievement that saved us much worry and further delay. By the log book, I find we re-fuelled in 26 minutes with the aid of the military, who courteously refused payment. I remember receiving a similar act of speedy courtesy from the Polish Air Force in Krakow. Trying to secure a quick fill-up at Tempelhofen forms an enlightening comparison; it is a half-crown taxi fare from the hangar to the aerodrome office and the man you pay for petrol roosts in the roof.

All these drawbacks, however, are temporary. The advent of a little more traffic and man's natural irritability and bad temper will put things right. Even now it is almost impossible to land at a large foreign aerodrome without hearing of a D.H. "Moth" that has just gone by. For the time being, one must restrict the length of one's daily journey. One day we shall have a machine with standard tanks for six hours' petrol. As we sat growling at uneatable food in the barrack-



Map tracing all the European private air tours carried out by Mr. I. McClure up to date. He learned to fly with the London Aeroplane Club and has owned two Cirrus-Moths. The first he registered on June 8, 1927, shortly after qualifying as a pilot

Snapshot of the town of Riga (left) and the beach at the Isle of Nordeney. These places were visited by Mr. I. McClure during a recent private air tour in his own D.H. "Moth" (Cirrus Mark II engine).

like squalor of Warsaw, we discussed the flesh-pots of Buda-Pest. We only needed a cruising speed of 110 miles an hour, so as to be independent of the wind, and six hours' petrol, so as to abolish all anxiety, and misery could have been exchanged for satisfaction. As it was, to reach Berlin with the wind dead against us, we had to land at Poznan for petrol, and the only advantage that we had over the pedestrians who accompanied us on our journey was that they had to dodge the bicycles that kept on overtaking us.

It is a mistake to make a fetish of speed, any more than of money. Riches do not bring happiness, but I never heard that poverty did either. In itself it may be pleasant enough to remain virtually motionless over the marshes of Latvia and watch three generations of lampreys come to maturity and perish; dashing along at 20 miles an hour we should have missed that. If, however, at the same time one is nursing a desire to reach Riga before the petrol runs out, and before darkness comes on, one considers, with impatience, those who say that 60 miles an hour is good enough for them. The wind was invariably against us. If we altered course, the wind would change too, so that "UR" came aptly to be christened the "Weather Cock." It is because of the winds in Europe, where big distances exist between aerodromes, that we need, and will soon be getting more suitable aeroplanes. And the first thing that we do when we get them will be to cut out as many landings as possible. When touring, spend your time where you want to, not where you have to.

If I appear to grumble, and I mean to, it is because there is so little that requires doing to make Continental touring by air a beneficial source of pleasure to us English. We have been so successful with our motor industry that we have defeated our own object; we can make motor cars, but we can't make room for them. That will help to drive us into the air. There is comparatively little incentive to travel from place to place in England by air. It is rather the superior facilities for going abroad that the aeroplane gives that constitutes its chief attraction. This must produce one day or another a change of outlook. As motorists, we have regarded England as the home touring area, with occasional trips to Europe. The aeroplane will make us Europeans. Not until we cross the frontiers of our own continent shall we consider ourselves truly abroad.

Europe can only be seen from the air. The man who has not seen Norway from above has seen only half her beauty. It may be seen with greater appreciation, and more peace of mind from a seaplane than a land-plane. In fact, all North Eastern Europe is better visited by seaplane. The callous indifference with which we set that Cirrus engine the task of flying for hours and hours over sea, forest and bog, where a forced landing meant the most sinister disaster, was certainly a naughty piece of work, which came out all right in the end. Otherwise, we might have had to trek across arctic wastes with tennis racquets on our feet, spearing blubber or what-not for breakfast, and finally being eaten by arctic explorers.

Those who have not seen the Baltic States from the air have not seen them at all and have missed very little. Over Latvia and Lithuania we were experimenting with two different kinds of map. One was a blank sheet of paper, the other was laboriously covered with the conventional sign for marshes. Both were equally valuable. We were sufficiently far North to notice a tendency for the compass to swing and to continue swinging. The wind was blowing from the usual direction.

Those who have not seen the inside of the railway station at Riga as we saw it one Sunday morning have missed comprehending the whole history of Russia.

That night in a sordid Palais de Dance we drank neat Vodka out of tumblers. One should be willing to try anything once.

In a short article it is obviously impossible to give a description of all the places we visited, mainly for the reason that such fleeting impressions as we gained are hardly worth recording. The whole purpose of the journey was to find out what places were worth visiting again.

Among these is unquestionably Danzig with its neighbouring summer resort of Zoppot. By light aeroplane it is by no means inaccessible. The clear atmosphere, the blue of the Baltic, the sand fringed with woods—all have left with me a pleasant memory. There is roulette, excellent food, a very comfortable new hotel and a very interesting change of people from what one is accustomed to nearer home.

Travemund by Lübeck looked very pleasant from the air, with yachts and good beach and pleasantly laid out grounds. At the aerodrome a cheery ex-Commander of Submarines showed us the new Rohrbach "Romar" in process of assembly.

On the other hand, the much vaunted island of Nordeney is, as a summer resort, dreary. The usual seaside dishevelment on a sand-dune in the North Sea.

Oslo, a chill granite city, has the most beautiful surroundings when seen from the air. The aerodrome at Kjeller is 10 minutes by taxi from the station and 40 minutes thence by train from Oslo. Even Croydon can hardly beat that. The landing fee should be the subject for a question in the house.

There was a chill reminder of England in the evening at Oslo, when they took away our drinks at half-past eleven

If they had an aircraft industry to bolster up, I could understand such a regulation there. In this country it is well known that the heartiest supporters of the "dry" party are those who have the future of civil aviation at heart. The more restrictions we have at home, the more people will fly from the country.

May I close with the remark that the world's best bar is unquestionably in Hamburg. It is open all night.

NEW LIGHT 'PLANE ALTITUDE RECORD

"Cirrus-Moth" Reaches 23,000 Feet

SUBJECT to the usual confirmation a new altitude in the light 'plane class has been established by Lady Heath. On October 4 she reached 23,000 ft. in her "Cirrus-Moth," after taking off from Croydon Aerodrome. The time taken was 1 hr. 10 mins. No oxygen apparatus was used and Lady Heath did not feel any necessity for it. The cold at the altitude reached was intense and frost formed on her goggles, but visibility was excellent, not a cloud floating in the sky, and the coast of France could be seen from Croydon.

But for the fact that she thought her engine might stop in a rarer atmosphere a greater performance could have been made. She ascended at 11.55 a.m., and after gaining the altitude in 1 hr. 10 mins. she descended in 10 mins. Two sealed barographs were carried and they were taken charge of by

Lieut.-Commander H. Perrin, Secretary of the Royal Aero Club, who observed the flight on behalf of the Royal Aero Club.

The previous record was held by Captain and Mrs. G. de Havilland, who, on July 25 last, ascended to 21,000 ft. in a "Gipsy-Moth" from Stag Lane Aerodrome, London.

On July 10 of this year Lady Heath put up an altitude record for light seaplanes by reaching 13,400 ft. in the Short "Mussel," fitted with a Cirrus Mk. II engine. Her passenger was Miss S. O'Brien and the attempt was started from the Medway at Rochester. The total time taken to reach that altitude was 1 hr. 32 mins., and the rate of climb at 13,400 ft. was 54 m.p.h.

On May 18, 1927, Lady Heath, with Lady Bailey as her passenger, made a record of 16,000 ft. in an Avro "Avian" Mk. II Cirrus. They ascended from Hamble, Southampton. Then on July 5 Lady Bailey made an attempt of her own, with Mrs. G. de Havilland as passenger, and put up a new record of 17,284 ft. in a D.H. "Moth" (Cirrus). They took-off from Stag Lane Aerodrome.

Lady Heath then tried to beat that height on an "Alpha-Avian" light 'plane at Woodford, Cheshire, on October 8 in the same year, but her certified total tied with that of Lady Bailey's and in accordance with the conditions governing altitude records Lady Bailey retained the record.

On this latest record by Lady Heath the "Cirrus-Moth" had K.L.G. plugs and the petrol and oil was B.P. and Castrol respectively.

Incidentally the A.D.C. Cirrus was a Mark III.

LIGHT 'PLANE CLUBS

London Aeroplane Club, Stag Lane, Edgware. Sec., H. E. Perrin, 3, Clifford Street, London, W.1.

Bristol and Wessex Aeroplane Club, Filton, Gloucester, Secretary, Major G. S. Cooper, Filton Aerodrome, Patchway.

Cinque Ports Flying Club, Lympne, Hythe. Hon. Secretary, R. Dallas Brett, 114, High Street, Hythe, Kent.

Hampshire Aero Club, Hamble, Southampton. Secretary, H. J. Harrington, Hamble, Southampton.

Lancashire Aero Club, Woodford, Lancs. Secretary, F. W. Atherton, Woodford Aerodrome, Cheshire.

Liverpool and District Aero Club, Hooton, Cheshire. Hon. Secretary, W. F. Davison, 357, Royal Liver Building, Liverpool.

Midland Aero Club, Castle Bromwich, Birmingham. Secretary, Maj. Gilbert Dennison, 22, Villa Road, Handsworth, Birmingham.

Newcastle-on-Tyne Aero Club, Cramlington, Northumberland. Secretary, J. T. Dodds, Cramlington Aerodrome, Northumberland.

Norfolk and Norwich Aero Club, Mousehold, Norwich. Secretary, G. McEwen, The Aerodrome, Mousehold, Norwich.

Nottingham Aero Club, Hucknall, Nottingham. Hon. Secretary, Cecil R. Sands, A.C.A., Imperial Buildings, Victoria St., Nottingham.

The Scottish Flying Club, 101, St. Vincent Street, Glasgow. Secretary, Harry W. Smith.

Southern Aero Club, Shoreham Sussex. Secretary, C. A. Boucher, Shoreham Aerodrome, Sussex.

Suffolk Aeroplane Club, Ipswich. Secretary, Maj. P. L. Holmes, The Aerodrome, Hadleigh, Suffolk.

Yorkshire Aeroplane Club, Sherburn-in-Elmet, Yorks. Secretary, Lieut.-Col. Walker, The Aerodrome, Sherburn-in-Elmet.

LONDON AEROPLANE CLUB

REPORT for week ending October 7,—Total flying time, 70 hrs. 35 mins. Dual instruction, 30 hrs. 10 mins. Solo flying, 40 hrs. 25 mins.

Thirty individual members flew solo during the week and 38 were given flying instruction.

On Saturday, the 6th inst., Miss Fletcher made the qualifying flights for the aviator's certificate.

Solo flying.—P. W. Hoare, who flew over 15 hrs. during the last month, has already completed his maximum amount of subsidy flying time for the year. During the week-end Mr. Hoare made a flight to Newcastle and back.

C. W. Bonniksen, who recently obtained his "A" licence and has his own "Moth," flew to Leamington and back.

Pilot Instructors.—In establishing the record flying time for September, the two Club pilot instructors were given very little rest, as the following figures will indicate :—V. H. Baker, 103 hrs. ; F. R. Matthews, 84 hrs.

Many war-time pilots are availing themselves of the facilities offered by the Club to keep up their flying. Captain Roche-Kelly, T. Elder Hearn, J. V. Fairbairn, J. A. G. Haslam, N. Young, and B. O. Davis are amongst the regular soloists.

BRISTOL & WESSEX AEROPLANE CLUB, LTD.

REPORT for the week ending October 6.—Total flying time, 22 hrs. 5 mins. Dual instruction, 11 hrs. Solo flying, 8 hrs. 25 mins.

Bad weather has curtailed our work considerably this week, but in spite of this we have done some useful flying.

In all 10 pupils received instruction during the week, two in solo flying. Several members broke new ground—Mr. Hall made a successful first solo cross-country flight from Stag Lane to Filton, Mr. Clarke made his first solo flight, and Mr. Evans had his first dual instruction.

Mr. Downes Shaw flew to Stag Lane and back, and Mr. Bartlett and Mr. Dutton to Sherborne and return.

Several new pilot members have joined us during the week, and prospects are good now that we have our second Moth TV back from overhaul.

CINQUE PORTS FLYING CLUB

REPORT for week ending October 6.—Machine S.S. : N.N. undergoing repainting. Total time for week : 17 hrs. 35 mins. Test flights : 45 mins. Joy rides (with Maj. Clarke), seven : 1 hr. 10 mins.

Dual instruction with Maj. Clarke : Mr. Worsell, 1 hr. 30 mins. ; Mr. Walsh, 4 hrs. 15 mins. ; Mr. Mackinnon, 45 mins. ; Mr. Evernden, 15 mins. ; Mr. Swinnard, 1 hr. 15 mins. ; Mr. Sargent, 1 hr. 15 mins. ; Mr. Somerset, 2 hrs. ; Mr. Wood, 30 mins. Total, 11 hrs. 45 mins.

Soloists under instruction : Mr. Mackinnon, 2 hrs. 15 mins ; Mr. Walsh, 45 mins. Total, 3 hrs.

"A" Pilots : Mr. Skinner, 30 mins ; Mr. Edgson Wright, 15 mins. Total, 45 mins.

During this week, Moth N.N. was dismantled for painting and re-rigging, but Moth S.S. was in constant use.

Mr. Skinner, of Ashford, who qualified for his "A" licence last week, had some dual instruction with Maj. Clarke in aerobatics. During an unsuccessful loop, the machine hung on the top, and a watch belonging to the ground engineer fell out of Major Clarke's pocket somewhere over the race course. Anyone finding a somewhat battered watch in this locality is asked to return it to the secretary or the Aerodrome. Later, Mr. Skinner went out by himself for looping practice, and succeeded in doing two very good loops after two spectacular failures.

On Saturday, October 6, Mr. Mackinnon, of Tonbridge, and Mr. Walsh, of Folkestone, successfully accomplished their first solo. The Club heartily congratulates both members, who have passed through their training period quickly, and who are now flying very satisfactorily alone.

HAMPSHIRE AEROPLANE CLUB

REPORT for week ending October 5.—Total flying time, 34 hrs. 40 mins. Dual instruction, 21 hrs. 45 mins. "A" Pilots, 5 hrs. 20 mins. Solo, 2 hrs. 45 mins. Tests and passengers, 2 hrs. 10 mins.

Total time for the month of September, 175 hrs. Dual instruction, 87 hrs. 25 mins. "A" Pilots, 49 hrs. 35 mins. Solo, 21 hrs. 30 mins. Tests and passengers, 16 hrs. 30 mins.

Instruction with F/Lt. Swoffer and Mr. W. H. Dudley : Messrs. Brodrick, Tobutt, Reuther, Beagley, Buckley, Hall, Castley, Grahame Gibbs, Evershed, P. L. B. Wills, Evans, Alexander, Courtney, Milford, Miss Home, Lieut Roskill, Lieut. Des Graz, Lieut. Oswald, Cdr. Bell, Mrs. Gordon Smith, Maj. Thorn, Lieut. Coode, Miss Melvill, Mrs. Crook, Dr. Bowden.

"A" Pilots : Messrs. Bowen, Sanders Clark, P. A. Wills, Michelmore, Parker, Rayson, Curtis-Nuthall, Lieut. Heath, Miss Grace, Mr. Sturge.

Soloists : Messrs. Hall, Whittle, Evans, Evershed, Cdr. Bell.

Passengers : Messrs. James, G. Wills, Harrison, Payne, Harding, Miss Wills, Miss Norme, Miss Hoile, Miss Ford, Miss Eldred, Miss Catt, Miss Elizabeth, Miss Greenwood.

Mr. M. S. Hall completed his tests for the "A" licence this week. Mr. Evershed made a most successful first solo flight on Thursday last.

On Sunday last we were pleased to welcome Lady Heath and Captain Percival, who arrived on the latter's Avian.

We are still working with only one machine. The weather has been good, but a deep depression is centred over the Hampshire Club, owing to shortage of aircraft.

ISLE OF PURBECK LIGHT AEROPLANE CLUB

REPORT for week ending October 6.—Total flying time, 18 hrs. 40 mins.

Once again we have been able to settle down to Club work, and this week have had the satisfaction of producing our first two "A" certificates—C. O. Powis and L. A. Strange. The official observer's remarks on the former's performance was very gratifying.

We are indebted to Mr. Powis for the use of his Moth O.T., which has been assisting the hard-worked Spartan.

There is keen competition between the next half-dozen budding soloists and we all hope the good work will now continue in earnest.

LANCASHIRE AERO CLUB

REPORT for week ending October 6.—Flying time, 12 hrs. 55 mins. Instruction, 2 hrs. 55 mins. Solo flights, 5 hrs. 35 mins. Passenger, 3 hrs. 10 min. Tests, 1 hr. 15 mins.

Instruction (with Mr. Hall) : Messrs. Foote, Mills, Meads, Crosthwaite, Cohen, Kay, Barlow, Dane. (With Mr. Scholes) : Messrs. Dane, Chart.

Pilots.—Messrs. Caldecott, Hall, Meads, Twemlow, Crosthwaite, Lacayo, Mills, Cohen, Heath, Goodfellow, Chapman, Ruddy, Michelson.

Passengers (with Mr. Hall), Messrs. Williamson, Ashworth, Davies ; (with Mr. Caldecott), Messrs. Percival, Nelson, Humphreys ; (with Mr. Crosthwaite), Benson A. Stern ; (with Mr. Lacayo), Messrs. Whitehouse, Dyson ; (with Mr. Meads), Benson, J. ; (with Mr. Michelson), Mr. Goss.

Mr. D. E. Hall has taken over his duties as chief instructor and aerodrome manager.

The landing competition for the George Pemberton Trophy was won by Mr. R. F. Hall, with a total of 23 points out of a possible 30.

LIVERPOOL & DISTRICT AERO CLUB

REPORT for week ending October 6.—Total number of hours flown, 21.55 mins. Twenty-three members took dual instruction with Mr. Allen. Total time, 11 hrs. 25 mins. Ten soloists flew a total of 4 hrs. 55 mins. Three "A" pilots flew a total of 3 hrs. 5 mins. Tests, 40 mins.

Mr. Moulsdale flew his tests for R.Ae.C. certificate in a very satisfactory manner.

On Monday, Mr. Davison, our official observer, flew XX to Squire's Gate, Blackpool, to pass out several pupils of the Lancashire School of Aviation for their R.Ae.C. certificates. He and his passenger, Mr. Moulsdale, returned on Tuesday morning, having seen Blackpool illuminated !

On Thursday morning, Mr. Murrell, of Aerofilms, Ltd., piloted by Mr. Allen, flew for 1 hr. 50 mins. on aerial photography work. Mr. and Mrs. Bentley arrived on Friday in pouring rain, Bentley later returning to London. On Saturday Mr. Barber hit the deck rather too hard, with the result that XY requires a new undercarriage wing and prop. With great forethought, Mr. Barber had selected a machine which was due for a top overhaul, anyway. Constant rain on Friday and ground mists almost every evening have cut down our flying hours considerably.

Work on the clubhouse is proceeding, and the building will be ready for occupation by the end of this week. Gifts from members of chairs, small tables, and other suitable furniture will be most welcome.

MIDLAND AERO CLUB

REPORT for week ending October 6.—The total flying time was 36 hrs. 4 mins. Dual, 16 hrs. 50 mins. ; solo, 14 hrs. ; passenger, 4 hrs. 5 mins. ; test, 1 hr. 9 mins.

The following members were given dual instruction by Flight-Lieut. T. Rose, D.F.C., and Mr. W. H. Sutcliffe :—M. C. Wilks, F. D. Scott, C. T. Davis, O. L. Richards, T. W. Wild, J. K. Morton, J. B. Briggs, R. G. Welch, G. P. Haylock, F. J. Steward, W. J. Halland, J. Fitzgerald, A. E. Coltman, N. Blakeway, D. N. Khatri, T. Drury, J. Ridsdale, H. Coleman, H. Beamish, Dr. W. G. Tilleke, Maj. D. Thompson, Mrs. Leigh-Farmer.

"A" Pilots : R. D. Bednell, R. L. Jackson, C. W. Fellows, M. A. Murtagh, E. P. Lane, E. R. King, W. M. Morris, F. J. Steward, G. C. Jones, G. Robson, H. J. Lattey, G. V. Perry, S. Duckitt, S. H. Smith, J. Cobbe, G. Savage.

Soloists : J. K. Morton, O. L. Richards, W. J. Halland, J. Fitzgerald, J. W. Astley, T. H. Drury, A. E. Coltman, J. B. Briggs, Dr. W. G. Tilleke.

Passengers : E. Hanson, M. Turner, A. C. Scribbans, N. C. Harrison, J. H. Green, F. D. Scott, J. W. Astley, J. Fitzgerald, J. E. Hicks, Miss A. Bingham, Mrs. Griffin.

NORFOLK & NORWICH AERO CLUB

REPORT for week ending October 7.—Total flying time, 21 hrs. 15 mins.

Dual : Messrs. A. Kirkby, W. S. Coates, H. Justin, L. Morsor, W. S. Rope, C. Ransom, C. Browne, R. H. Wright, G. Anderson, C. Land.

Solo : Messrs. W. S. Coates, W. S. Rope, H. Neave, H. Pank, C. Ransom, L. Lowen, E. Lambert, H. Cator, R. F. W. Moore, A. G. Barrett, W. A. Ramsay, F. Gough, N. Brett, G. F. Surtees, A. G. Marshall, W. P. Cubitt, E. Varden Smith, R. T. Harmer, G. Anderson.

Messrs. W. S. Rope, L. Lowen, G. T. Anderson, A. Kirkby, and L. Morter have all carried out their first solos this week, and we congratulate them.

Mr. Fred Gough has completed 100 hours' flying this week, and he registered that time without a single crash to his name. It was most unfortunate, however, that 10 minutes afterwards his engine cut out, owing to a rocker-arm casting breaking, and compelled a prompt forced landing ; he had to register his first mishap.

YORKSHIRE AEROPLANE CLUB

REPORT for week ending October 6.—Flying time, 23 hrs. 15 mins. Number of pupils under instruction, nine ; hours flown, 7. Number of soloists, four ; hours flown, 3 hrs. 55 mins. Number of "A" pilots, 11 ; hours flown, 11 hrs. 45 mins. Passenger flights, three ; time, 35 mins.

On Sunday, September 30, Mr. George Lloyd did his first solo and put up a very good show.

Mr. G. Clapham, an old "B" licence pilot, made a reappearance after many months' absence, and is taking out an "A" licence.

We had a welcome visit from Lady Heath on Saturday on her "Moth" G-EBZC.

During the winter months the club will be open from 10 a.m. until dusk except on Tuesdays, when it will not be open until 2 p.m. Monday will continue to be observed as the weekly holiday.

We are endeavouring to develop the social side of the club, commencing with a whist drive on October 17 at 7.45 p.m. We hope all members and their friends will come along and support it. If this is a success, we hope to continue them during the winter months.

FROM THE FLYING SCHOOLS

Henderson Flying School, Brooklands Aerodrome

REPORT for week ending September 27.—Total flying time 21 hrs. 20 mins. Dual with Col. Henderson : Messrs. May, Kerr, Salah, Oldmeadow, Daniel, Hsiao, Brooks, D'Eyncourt.

Dual with Capt. H. D. Davis : Messrs. Groner, Hsiao, Swann, Kerr, D'Eyncourt, Daniel, Garthwaite, Mrs. Monkton, Mrs. Scott.

Soloists : Messrs. Pickthorn, Hsiao, D'Eyncourt, May, Daniel, Oldmeadow, Hill.

Over 400 passengers were carried during the week.

Mr. S. Daniel has nearly completed all his solo flights for his "B" licence.

Col. Henderson and Capt. Davis flew to Northampton this week-end to attend the Northamptonshire Aero Club Pageant, and were given a very good welcome by the Club officials and members. Both Col. Henderson and Capt. Davis were kept busy giving joy rides and had a very good week-end.

REPORT for week ending October 4.—Total flying time, 30 hrs. 55 mins.

Very little dual was done last week owing to our activities in joy-riding. A new private owner is about to come into being—Mr. J. L. May ; we have nearly completed building a Mono "Avro" for him.

A number of new pupils have applied to the school in the last fortnight, so our winter may be much busier than usual.

The De Havilland Flying School, Stag Lane Aerodrome

REPORT for week ending September 30.—Total flying time, 130 hrs. 30 mins Instruction : Dual, 38 hrs. 30 mins. ; solo, 41 hrs. Other flying, 51 hrs.

During the week two pupils obtained their "A" tickets, and another, Mr. R. F. G. Lea, a son of Sir Thomas Lea, of Dunley Hall, Stourport, carried out an excellent first solo.

Mr. K. M. Raha, one of our Indian pupils, has now carried out all his tests on an advanced type machine in a most competent manner. His two other compatriots are also progressing extremely well.

A new pupil to join our school is Capt. Rivett Carnac, Chief Constable of Huntingdon. This is certainly a most encouraging sign of the advancement being made in all professions of "air-mindedness," and we trust that Capt. Rivett Carnac's lead will eventually give place to a "flying squad" in its most literal sense.

On Saturday we gave joy-rides to a large party from The Junior Institute of Engineers. They were all thoroughly delighted, and were inclined to marvel at the ease and practicability of the "Moth."

Several "Gipsy Moths" were delivered during the week, amongst those taking delivery being Miss W. E. Spooner, Hon. G. Cunliffe, and Mr. G. A. R. Malcolm, our Sales Manager.

REPORT for week ending October 7.—Total flying time, 111 hrs. Dual instruction, 32 hrs. 40 mins. Solo flying, 59 hrs. 50 mins. Other flying, 18 hrs. 30 mins.

One pupil carried out an excellent first solo, and another performed both his cross-country and height tests for "B" licence.

Although the flying school is getting slack, great activity prevails at the Stag Lane factory. New buildings are rapidly springing into being, and just as rapidly the production rate of the Gipsy "Moth" increases.

Amongst those taking delivery of new Gipy "Moths" last week were Lieut.-Comdr. Glen Kidston, R.N., who flew over in his newly-acquired Fokker monoplane ; Sqdn.-Ldr. the Right Hon. F. E. Guest, P.C., C.B.E., D.S.O., M.P. ; and the Basle Aero Club, a newly-founded aeroplane club in Switzerland. Many other machines were despatched (per regular programme) to Canada and Australia.

The *Daily Mail's* new D.H.61 has been undergoing tests, and will shortly be ready for handing over.

Aerodrome for Stoke-on-Trent Suggested

REPRESENTATIVES of the Stoke-on-Trent City Council have interviewed the Air Ministry on the question of a municipal aerodrome. Proposals are to be brought before the Council at a later date.

Hull Air Club

THERE is every likelihood that Hull will have an aeroplane club by next spring.

Some time ago, following the visit of Sir Sefton Brancker, Director of Civil Aviation, an effort was made to form a club, and, although there was a good response on the part of the public to join the club, the project was temporarily abandoned owing to lack of funds.

Now, Messrs. Ranks, of Hull, have made a handsome offer of an initial donation, on condition that two other Hull firms will give like amounts. This would mean that the club could be formed at once, since the promoters have promises of various smaller amounts.

The need of an aeroplane club as the nucleus of the city's future air activities has been emphasised on many occasions, and the facilities of the Brough aerodrome have been gratuitously offered to the projected club.

Flying Marquess and Flying Sister

LADY MARGARET DOUGLAS-HAMILTON, second daughter of the Duke and Duchess of Hamilton and Brandon, is an aviation enthusiast. She has devoted a great deal of time studying the art of flying, with her brother, Lord Clydesdale, as instructor.

Berks, Bucks and Oxon Aeroplane Club

THE above club is organising an inaugural meeting, taking the form of an Air Pageant, for Saturday, October 27, 1928, to be held at Sheep Bridge Farm, Basingstoke Road, Swallowfield, Reading, by very kind permission of Mrs. Hunter, of Beech Hill, Berks. Features of interest will be joy-riding, air races and competitions, also stunt flying and demonstrations by many well-known pilots. Flying will commence at 11 a.m. till sunset.

Duchess of Bedford

IN her D.H. "Moth" the Duchess of Bedford landed at Hooton aerodrome recently, piloted by Capt. C. D. Barnard, and after refuelling resumed her flight northward.

The Bournemouth Young Airmen's League

THE above-named movement has for its aims and objects : The encouragement of young boys in airmindedness and the necessity for aviation in the future of the British Empire.

The members are boys between the ages of 13 and 15 years, and are very keen on the work, which at present consists of learning the elementary principles of flight and general construction of machines from a 4-ft. span model.

They are also constructing a large machine with a span of 18 ft. for instruction in rigging and general ground work.

The movement is entirely self supporting, the boys paying a small subscription of 3*d*. per week and 6*d*. on enrolment.

Badges denoting rank are given as members qualify for same, and are worn on sleeve of coat, the uniform consisting of blue double-breasted blazer with brass buttons and grey flannel shorts with peak caps.

Disciplinary training after the manner of boy scouts is also a part of the programme. These particulars have been kindly sent to us by Mr. Charles Longman, the secretary, The Cottage, 28, Wimborne Road, Bournemouth.

New Aerodrome

IN our issue of September 27 we mentioned briefly the proposal for a new aerodrome at Heston, Middlesex. In a communication, on October 1, Mr. F. A. I. Muntz informs us that a new company—Airwork, Ltd.—has been formed to establish this aerodrome. The directors are Mr. Muntz himself and Mr. H. N. St. V. Norman, both of whom are private owners and pilots of considerable experience. Their names have appeared in our private owners' tables. The new aerodrome will be 450 yards by 600 yards initially, and finally 800 yards by 800 yards. The soil is gravel and London brick earth, and the land is well drained. Hedges are no higher than 2 ft. Situation is north of Cranford Lane and near the Grand Junction Canal. It is 1 mile from Southall station, and 1 mile from Hounslow District Railway station. It is easily visible from the Great West Road. The aerodrome will probably be opened next April. Mr. Nigel Norman is at present touring Poland and Germany in his D.H. "Moth," collecting information about aerodromes. Mr. Muntz flew to Berlin in his D.H. "Moth" for the Berlin Aero Show.

FLIGHT
AIRCRAFT ENGINEER AIRSHIPS

Catapulted Air Mail Suspended

IT is now announced that the air mail service which operated in conjunction with the liner *Ile de France* on her voyages across the Atlantic has been temporarily suspended. It was due to recommence on October 10, after the recent forced landing off the Scilly Isles.

Airships for America

THE Navy Department of America has awarded the Goodyear Zeppelin Corporation a contract for the building of two large airships at a cost of £1,956,250. Each will hold 6,500,000 cubic ft. of gas. Thirty months will be allowed for the construction of the first ship and fifteen for the second. A hangar will be designed in the hulls to house five scouting machines. The Goodyear Blimp NE 7 non-rigid airship succeeded in landing safely after three attempts on the roof of a Washington building on October 5, and remained there for five minutes.

Air Speed Record

FLIGHT-LIEUT. D'ARCY GREIG made a second trial flight at Calshot on October 7 in the Supermarine-Napier S 5, and his reported maximum speed was about 298 m.p.h. The test lasted 25 mins., and he flew four times up and down the course, observing the conditions to be fulfilled at the attempt on the record.

High-Speed Flight

FLYING OFFICER R. L. R. ATCHERLEY, of the R.A.F., famed for his aerobatic flying at air meetings, has been attached to the new High Speed Flight at Calshot formed for the purpose of contesting the next Schneider Trophy Race. It is reported that owing to a slight hitch involving Flying Officer C. S. Staniland's length of service, his inclusion in the High Speed Flight has temporarily been suspended, and he has returned to Northolt. He won two out of five motor-cycle races at Brooklands on October 6.

Rail Trucks for Aircraft

THE L.N.E.R. are constructing a new type of covered railway truck to carry three motor-cars, aeroplanes and other goods.

Australian Air Force Criticisms

AIR MARSHAL SIR JOHN SALMOND, who has recently inspected the Australian Air Force and its general system at the request of the Commonwealth Government, has reported that owing to the obsolete types of service machines, the entire absence of reserve equipment, and the low standard of training, he considers the Royal Australian Air Force to be totally unfit for war operation with the Navy or Army. He recognises that the defects are largely due to the immense difficulties inseparable from the building of an Air Force in the initial stages without the properly established organisation. Within nine years additions should make the strength :—One Army co-operation squadron, two bombing reconnaissance squadrons, two coast reconnaisance boats, recruits' training section, wing headquarters, cadets training wing at the Military College at Duntroon, and a Citizen Air Force Squadron. He estimates the capital expenditure needed for the scheme at £1,235,000 ; for equipment £748,000 ; for works services, £8,000 ; and for specialist training for officers and annual maintenance, £652,000.

Zeppelin Trials

DURING its recent trial flight, in which the English coast was crossed, the new Graf Zeppelin, under the command of Dr. Hugo Eckener, also flew over the occupied territories of the Rhineland, thereby infringing a breach of the regulations of the Rhineland High Commission. A statement was volunteered from Germany explaining that through an error in navigation, the Zeppelin thus inadvertently committed the infringement. On October 8 the last test flight was made, and the flight to America was expected to begin shortly.

British Attempts on Records

BEFORE SQDR.-LDR. JONES-WILLIAMS attempts a long-distance record in the new Fairey monoplane on a course from Cape Town towards London, a distance of 6,000 miles, he will try to set up a new record for duration by flying round England for three days and three nights non-stop. If successful, the machine will then be shipped to Cape Town. It is expected that the machine will be ready for tests in less than a fortnight now. Sqdr.-Ldr. Jones-Williams has taken the place of Sqdr.-Ldr. J. Noakes, who has been injured through a recent accident whilst testing.

New Italian Air Lines

THE programme for the development of civil aviation recently announced by Signor Balbo is being rapidly carried out. The new air lines connecting Italy with Sardinia, Albania and Munich have been working for some time, while two other lines are about to be opened between Rome and Barcelona, and Rome, Syracuse and Tripoli. Signor Balbo has just completed a trial flight over the Rome, Syracuse and Tripoli line, which proved highly satisfactory. The distance of 1,200 km. (about 750 miles) was covered in 7 hours ; by rail and boat the journey from Rome to Tripoli takes two days and three nights. The machine employed on this new service flies at 180 km. (about 112 miles) an hour, and can carry 19 passengers in two cabins.

German Civil Aviation

MAJOR VON TSCHUDI, the Vice-President of the German Aero Club, Managing Chairman of the German Air Council, and German representative on the Federation Aeronautique Internationale, died on October 7.

D.H. " Moths " for Chili

SOME time ago the Chilian Military Air Force gave an order for twenty Cirrus-Moths, which were duly delivered. It was understood that if expectations were justified a repeat order would follow. Chili now wants forty Gipsy-Moths. Six will be shipped out this month, and the others will follow between now and the end of the year. All of them will be fitted with the D.H. Safety Belts in place of the ordinary safety belts. Twenty of them will have extra tankage for long-range work. These Gipsy-Moths will be used for training or " refresher " work, and communication flying.

Lady Bailey Returning

ON her return flight from Cape Town to London in her D.H. " Moth " (Cirrus) Lady Bailey reached Loanda (Angola) from Leopoldville on October 5. Slight repairs there delayed the resumption. Her visit coincided with the arrival of the Portuguese airmen, Captain Pais de Ramos and Captain Oliveira Viegas, who are flying to Mozambique from Lisbon. Both flights aroused great interest.

London to Berlin by Seaplane

IN a Blackburn " Bluebird " Col. The Master of Sempill left England on October 5 for Berlin to attend the Berlin Aero Exhibition. He ascended from Ruislip reservoir, flew to Felixstowe, and set off again two hours later for the sea crossing of 100 miles to Amsterdam. His intended course then was *via* Norderney Island, north of Emden and Hamburg. On October 10 he lectured at the request of the German authorities on " Civil and Commercial Aircraft."

Whose ?

AEROPLANE wreckage has been washed ashore at the island of North Ronaldshay, Orkney.

Mystery of Col. Fawcett

THERE is comment in Brazil over Commander Dyott's statement that Indians in that country murdered the British explorer, Colonel Fawcett. Newspaper critics declare that Commander Dyott has produced no proof of his assertions, and claim that Colonel Fawcett went into unexplored regions, whereas Commander Dyott followed the route used by all travellers going from Matto Grasso State down the Xingu River to the Lower Amazon. Colonel Fawcett and his two companions have been missing for three years. Recently, Commander Dyott, who went in search of them, said he saw an Indian wearing a shirt which had belonged to Colonel Fawcett, but he has since admitted that he has no sure evidence of the explorer's death.

Aircraft Accidents in U.S.A.

ACCORDING to the *Daily Express* correspondent, 390 aeroplanes crashed in the United States during the first six months of this year, resulting in 153 deaths. This is an increase of 190 as compared with the whole of 1927.

"Aviation Corporation of the Americas"

PLANS for the inauguration of a great new civil aviation scheme which will link together by a single arterial airway the United States, Central America and South America, have been completed They are officially announced with the final organisation in New York of the "Aviation Corporation of the Americas," and the election of the first Board of Directors of this new concern. The new organisation, which forms what is claimed to be the largest international air-mail and passenger system in the world, will bring the West Indies within one day's journey, and Central America and Panama within two days of New York. Sponsoring it are prominent banking interests, and leading men identified with the development of American civil aviation. Mr. Richard F. Hoyt is to be Chairman, and the President will be Mr. Cornelius Vanderbilt Whitney.

The new company will control through ownership of the capital stock, Pan-American Airways, Inc., which was the pioneer in the establishment of an airway to Latin-America and the first international airmail passenger service to operate from the United States. Through Pan-American Airways, which will be the operating company, the Aviation Corporation of the Americas will project and manage a widespread system of international airmail and passenger routes under contracts from the U.S. Post Office, concentrating at first on the opening up of routes between the United States, the West Indies, Central and South America. The mileage covered will be the largest mileage covered by any air transport company in the world.

In an announcement made at the head offices of Messrs. Hayden Stone and Co., the New York bankers, Mr. Hoyt stated that all the capital of the new enterprise, amounting to 223,400 shares of no par value, and representing an investment of substantially over $3,000,000, had already been privately subscribed.

First National Aeronautical Safety Conference

THE first national conference on the problem of safety in aeronautics (the first as regards modern aeronautics, that is) was held on October 4-5 in New York City under the joint auspices of the Daniel Guggenheim Fund for the Promotion of Aeronautics and the National Safety Council. During these two days—the concluding ones of the Seventeenth Annual Safety Congress—papers, followed by discussions on various aeronautical problems, were given.

Tour of the Cierva Autogiro

THE mishap that occurred to the Autogiro (Lynx) at Paris recently during a demonstration flight by Señor de la Cierva was due to a towing wire of the undercarriage breaking following a minor collision with a stump during a previous landing. Neither the pilot nor his passenger were hurt. The Continental tour was resumed with a demonstration at Brussels on October 4. From Brussels the tour continued to Berlin via Cologne and Cassel, the pilot being Flight-Lieut. Rawson, the Cierva Co.'s test pilot. His passenger was Mr. Blake, the company's secretary. Señor de la Cierva has been personally invited to Berlin during the exhibition by the German Lufthansa. The return course of the Autogiro will be through Amsterdam and Rotterdam to Paris, where a stay may possibly be made.

Another machine of this type also with the Armstrong-Siddeley "Lynx" 180 h.p. engine was recently put through tests by Flight-Lieut. Rawson under the supervision of Italian officials, for that country has purchased the machine. A top speed of 106 m.p.h. and a climb of 750 ft. per minute were accomplished.

Amundsen's Death Theory

THE French examination of the float which had belonged to the Latham flying-boat in which Capt. Amundsen and Comdt. Guilbaud set off for Spitzbergen from Tromsoe to take part in the rescue of the Nobile airship expedition and disappeared, has suggested that the machine nose-dived and the crew were killed instantly. It was found by fishermen on September 1 off the Island of Fugloe.

Army Officers and Flying

IT has been decided that Regular Army officers will not be selected for courses in flying with the R.A.F. unless they volunteer to fly and state their willingness in writing to do so. The courses will be made up only from those who volunteer.

"The Technical Development of the Aeroplane"

AN extremely interesting paper on the above subject was read before the R.Ae.S. and Inst.Ae.E. on October 4 by Mr. J. D. North. As it is of a highly technical nature, we propose to publish it in our next issue of the AIRCRAFT ENGINEER.

$250,000 on Offer

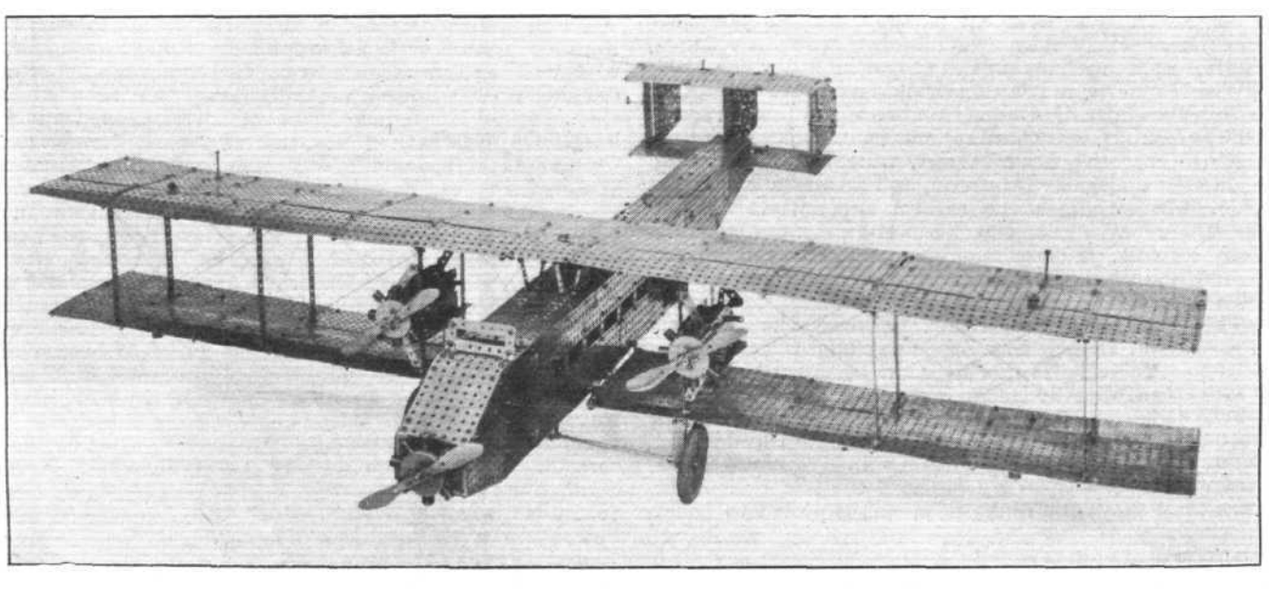
A CORRESPONDENT in San Francisco writes as follows:—

> "A reader with $250,000 capital of his own wishes to get some one in England with $250,000 to join him in an airplane company," etc.

If any of our readers would wish to be placed in communication with the writer, any letter forwarded to "Frisco," care of the Editor of FLIGHT, will be forwarded.

Not Intended for Publication!

IN certain printings of last week's issue of FLIGHT, some cryptic words appeared at the top of the de Havilland "Gipsy Moth" advertisement (p. xviii), viz.: "The Propeller of Aeroplane." We are afraid that this must have sorely puzzled some of our observant readers. As a matter of fact, the explanation is quite simple: the words were merely instructions (written on the printer's proof) to place the picture of the machine, so that the propeller was at the top of the page—which the printer set up in type and included as part of the advertisement! FLIGHT was already printing when this was discovered, and so a certain number of copies were printed before the error was rectified. Who knows, perhaps these copies may one day, a la philatelic manner, rank as scarce "errors" and become especially valuable!



A MECCANO "ARGOSY": The accompanying scale model of the Armstrong-Whitworth "Argosy" is built throughout with standard Meccano parts. It has a span of 65 in. and a length of 52 in.; each of the three engines is operated by its own electric motor run from a 4-volt accumulator. The "joy-stick" operates the ailerons and elevators, while a rudder bar actuates the rudders—true to life! We would draw Mr. Handley Page's attention to the new circular slots fitted to the wings—and other parts.

FLIGHT

THE ROYAL AIR FORCE

London Gazette, October 2, 1928

General Duties Branch

The following Flight Lieuts. are granted permanent commns. in their present rank (Oct. 1) :—F. H. Woolliams, W. Wynter-Morgan, M.C. (Capt. Glos. Regt., T.A.) Pilot Officer A. M. Butt (Sec. Lt. Devon Regt., T.A.) is promoted to rank of Flying Officer (Aug. 1) ; Pilot Officer on probation C. K. Turner is confirmed in rank and promoted to rank of Flying Officer (Aug. 31). The following Pilot Officers on probation are confirmed in rank (Oct. 3) :—M. H. Clare, A. G. Lester.

Flying Officer J. St. C. Arbuthnott takes rank and precedence as if his appointment as Flying Officer bore date Sept. 12, 1927, immediately following Flying Officer Arthur Harold Owen on the gradation list. Reduction takes effect from Sept. 2, 1928.

Wing-Commander H. A. Williamson, C.M.G., A.F.C., is placed on retired list at his own request and is permitted to retain rank of Group Captain (Sept. 30) ; Flying Officer D. G. Fleming is placed on retired list at his own request, and is granted permission to retain rank of Flight Lieut. (Oct. 1).

The following Flying Officers resign their permanent commns :—C. H. Ratcliffe (Sept. 26) ; F. W. L. C. Beaumont (Oct. 3). Pilot Officer A. R. Grenfell relinquishes his short-service commn. on account of ill-health (Oct. 3). The short-service commns. of the following Pilot Officers on probation are terminated on cessation of duty (Oct 3) :—R. A. Bloice, D. S. Collins, W. Smith, H. V. Thomas.

Stores Branch

Flight Lt. A. Davidson, M.C., is promoted to rank of Sqdn. Leader (July 11).

Accountant Branch

Pilot Officer (Observation) F. C. Rendle resigns his permanent commn. (Sept. 14).

Medical Branch

Flight Lt. R. J. K. Chattey is transferred to Reserve, Class Dii. (Sept. 28).

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The following are granted commns. on probation in the ranks stated, with effect from Oct. 2 :—Class A.—Flying Officer F. T. Digby, Flying Officer A. T. E. Eadon. Class B.B.—Pilot Officer G. B. K. James.

H. Hollick-Kenyon is granted a commn. in Class C as Flying Officer (Oct. 2) ; Pilot Officer on probation E. H. Armitage is confirmed in rank (Sept. 15).

The following Flying Officers relinquish their commns. on completion of service :—J. W. Bowler (Sept. 23) ; C. G. Gass, M.C. (Sept. 30). Flying Officer C. T. Travers resigns his commn. (July 24). The commns. of the following Pilot Officers on probation are terminated on cessation of duty :—E. M. King (Sept. 14) ; J. W. T. Jones (Sept. 12).

Flying Officer I. N. C. Clarke, D.S.C., is removed from the Service (Sept. 3)

Flying Officer L. J. C. Harding relinquishes his commn. on account of ill-health, and is permitted to retain his rank (Sept. 26).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duteis Branch

Wing Commanders : R. J. F. Barton, O.B.E., to Air Ministry (Directorate of Operations and Intelligence), for Air Staff Duties, 15.9.28. J. T. Babington, D.S.O., to Station Headquarters, Hinaidi, pending taking over command, 28.9.28. C. E. Maude to H.Q., Coastal Area, pending commencement of Senior Officers' Tech. course at H.M. Dockyard, Portsmouth, 28.9.28.

Flight Lieutenants : J. R. I. Scambler, A.F.C., to H.Q., India, 17.6.28. T. W. S. Brown to Elec. and Wireless Sch., Flowerdown, 2.10.28. F. P. Adams to No. 4 Flying Training Sch., Egypt, 28.9.28. R. W. Hill to H.Q., Middle East, 28.9.28. W. L. Payne to No. 47 Sqdn., Middle East, 28.9.28. F. C. Farrington, M.C., to Sch. of Army Co-operation, Old Sarum ; 9.10.28. H. S. Sandiford to No. 3 Flying Training Sch., Grantham, 16.10.28.

Flying Officers : J. A. C. Florance to No. 1 Flying Training Sch., Netheravon, 12.9.28. T. J. E. Thornton to No. 1 Stores Depot, Kidbrooke, 1.10.28. R. S. Barbour to No. 24 Sqdn., Northolt, 2.10.28. Hon. F./Lt. H. T. Herring to R.A.F. Base, Gosport, 3.10.28. C. A. Anderson to No. 6 Sqdn., Iraq, 17.9.28. L. G. Martin to No. 481 Flight, Mediterranean, 30.9.28. O. R. Pigott to R.A.F. Depot, Egypt, 28.9.28. P. G. Chichester to No. 4 Flying Training Sch., Egypt, 28.9.28. G. M. Pitts-Tucker to R.A.F. Depot, Uxbridge, 9.9.28. J. A. Tindall to No. 4 Flying Training Sch., Egypt, 28.9.28. D. S. King to No. 208 Sqdn., Middle East, 28.9.28. A. K. K. Calwell to No. 208 Sqdn., Middle East, 28.9.28.

Pilot Officers : A. L. T. Naish to No. 100 Sqdn., Bicester, 19.9.28. M. G. Bircham to No. 11 Sqdn., Netheravon, 24.9.28.

Stores Branch

Squadron Leaders : A. J. M. Ross, M.B.E., to No. 10 Group, H.Q., Lee-on-Solent, 24.9.28. T. E. Drowley to Air Ministry (Directorate of Equipment), 24.9.28.

Flight Lieutenants : H. E. Tansley, M.C., to Supply and Stores Depot, Aden, 12.9.28. E. G. Keeping to R.A.F. Base, Malta, 29.9.28. A. H. Allan to Supply and Stores Depot, Aden, 29.9.28.

Flying Officers : J. F. Young, M.M., to Supply and Stores Depot, Aden, 29.9.28. N. Dainty to Supply Services, Iraq, 28.9.28. R. T. Rich to Supply Services, Iraq, 28.9.28. A. E. Connolly to R.A.F. Depot, Egypt, 28.9.28.

Accountant Branch

Flying Officers : C. E. Aston to Command Accounts Office, Baghdad, 28.9.28. S. W. Hill to No. 4 Flying Training Sch., Egypt, 28.9.28. J. P. Cave to No. 2 Armoured Car Co., Middle East, 28.9.28.

Chaplains' Branch

Rev. C. A. B. Allen, M.A., to H.Q., Iraq Command, 28.9.28. Rev. H. Thomas, B.A., to H.Q., Transjordan and Palestine, 21.9.28.

Medical Branch

Flight Lieutenants : B. W. Cross to No. 31 Sqdn., India, 2.9.28. P. H. Perkins to Station H.Q., Hinaidi, 4.9.28.

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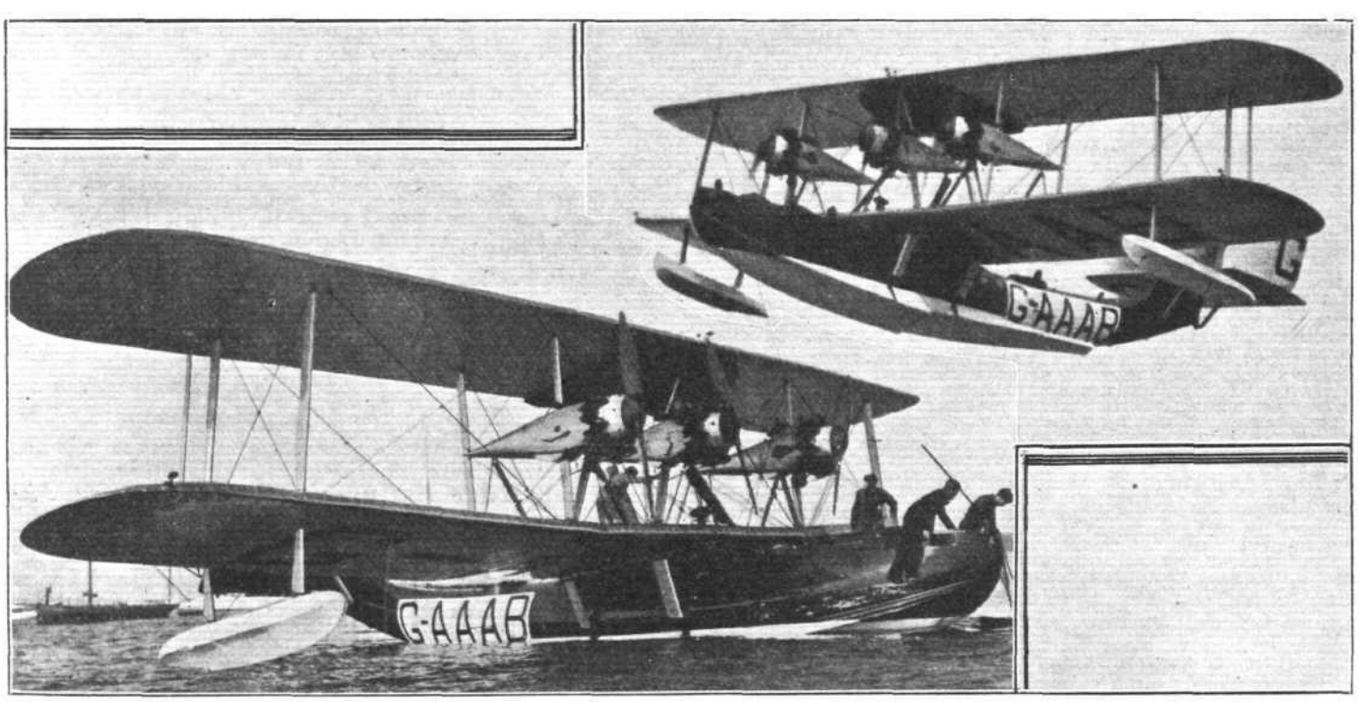

THE SUPERMARINE "SOLENT" AIR YACHT : Two views of the Supermarine flying-boat, fitted with three Armstrong Siddeley "Jaguar" engines, which—as previously reported in FLIGHT—the Hon. Ernest Guinness chartered for a cruise over the Irish Lakes. It was specially fitted out as an aerial yacht, and was piloted by Capt. H. C. Baird.

CORRESPONDENCE

"STEP RESISTANCE"

[2175] I have read Mr. Langley's letter, published in your issue of September 20, 1928, and found his remarks of much interest.

With reference to my notes on "Step Resistance," referred to by Mr. Langley, and which were published by Mr. Munro in his recent articles on "Seaplane Float Design." Mr. Langley believes that I was overstating my case by claiming a bigger drag reduction than could be expected. Recent tests, with floats of clean design, have proved this to be correct but, I would point out, the notes and calculations published by Mr. Munro were made by me in 1925, when no actual test data was available. The calculations then made were based on the following assumptions :—

(1) The vertical surface of the step would give a drag approaching that of a plane surface normal to the wind.

(2) The float step could be collapsed flush with the planing bottom.

Several tests have now been made to determine the reduction in drag by fairing in the float step The L/D for the faired step case was 0·6, against 0·5 for the non-faired case. The increase is roughly one-fifth, and is the exact improvement that I predicted. The actual saving in brake horse-power at 300 m.p.h. (for two floats) is approximately 30.

These figures are for step-faired floats, but if the steps could be retracted, the saving would be still greater.

The utility of any scheme for fairing or collapsing the step depends very much on the method of operation. The mechanism must be simple and the operation automatic. While such a scheme may be worth consideration for a Schneider Trophy machine, it does not appear that any other class of aircraft would gain a sufficient increase in performance to justify the additional complications.

GEORGE H. DOWTY.

Cheltenham,
September 24, 1928.

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PERSONALS

To be Married

The engagement is announced, and the marriage will take place in December, between Wing-Commander C. C. MILES, R.A.F., and Miss SYDNEY BROWN, youngest daughter of the late Mr. Joseph Brown and Mrs. Brown, *of Stocksfield, Northumberland.*

The engagement is announced between HENRY WILLIAM PEARSON ROGERS, R.A.F., elder son of the late H. Pearson Rogers, of Johannesburg, and of Mrs. George Lunn, of 1, Ulster Terrace, Regent's Park N.W.1, and FRANCESCA MARY, only child of FRANCIS R. B. BISSHOPP, M.A., M.D. (Cantab.), M.R.C.P. (Lond.), and Mrs. BISSHOPP, of Parham House, Tunbridge Wells.

The engagement is announced between MAJOR NOEL BANNISTER TOMLINSON, of the Air Ministry Works Department, Cairo, and DORIS ISABEL KATHLEEN STOBART, daughter of Mr. and Mrs. Henry Stobart, of Church House, Belbroughton, Worcestershire.

Married

The marriage took place on October 4 at St. Saviour's, Oxton, Cheshire, of Mr. WILFRED DEAKIN BROOKES, 1st Squadron, R.A.A.F., eldest son of Mr. and Mrs. Herbert Brookes, of Melbourne, and grandson of the late Rt. Hon. Alfred Deakin, M.P., to Miss BETTY HEAL, youngest daughter of Mr. and Mrs. Albert H. Heal, of Oxton Hall.

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R.AE.S. AND INST.AE.E.

Official Notice

MR. SUTTON, who is lecturing before the Royal Aeronautical Society on Thursday, October 18, on "Light Alloys and their Use in Aircraft, with Special Reference to Corrosion Problems," is one of the best-known authorities in Great Britain on this subject. Mr. Sutton has been in charge of the Metallurgical Department of the Royal Aircraft Establishment for the past four years, carrying out special investigations on corrosion problems for the Air Ministry. He is a member of the recently appointed committee on corrosion appointed by the Iron and Steel Institute.

The commercial prosperity of aircraft is very much bound up with the successful use of light alloys which will be comparatively free from corrosion or deterioration, and Mr. Sutton explains very fully in his lecture what methods have been used to solve the problems raised, and indicates the future lines of development. The paper is one of great importance, not only to aircraft designers and engine designers, but to all those who are concerned with the employment of metals where weight for strength is any consideration.

The lecture will be given at the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, at 6.30 p.m., and will be illustrated with slides.

J. LAURENCE PRITCHARD, *Secretary*

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Royal Air Force Flying Accidents

THE Air Ministry regrets to announce that, as the result of a presumed descent in the North Sea, on September 6, of a Blackburn aircraft of No. 422 Flight, H.M.S. "Argus," the following personnel are reported missing :—Pilot Officer Samuel Hatton (Pilot) ; Lieut. Charles Sheldon Booth, Royal Navy ; and J. 77760, Telegraphist Edmund George Bourke Grigson.

As the result of an accident at Eastchurch to a Siskin machine of the Armament and Gunnery School, Eastchurch, on September 19, Flying Officer Athal Patrick de Woulf de Wytt, the pilot and sole occupant of the aircraft, was killed.

PUBLICATIONS RECEIVED

Engineering Aerodynamics. By Walter S. Diehl. The Ronald Press Company, 15, East 26th Street, New York. Price 7 dols.

Luftflotten Militärwissenschaftliche und Technischen Mitteilungen, Stubenring 1, *Vienna* 1. Price Mk. 5 ; bound Mk. 6.

The Bristol Fighter Mark IV. Air Publication 866. H.M. Stationery Office, Kingsway, London, W.C.2. Price 2*s.* net.

Aerobatics. By Major O. Stewart, M.C., A.F.C. Sir Isaac Pitman & Sons, Ltd., 39-41, Parker Street, Kingsway, London, W.C.2. Price 5*s.* net.

The Air Pilot's Map of Great Britain. Published by the Air League of the British Empire, Astor House, Aldwych, London, W.C.2, in conjunction with Cook, Hammond & Kell, Ltd., Westminster, London, S.W.

Aeronautical Research Committee Reports and Memoranda : No. 1141 (*Ae.* 310).—The Determination of the Horse-power Height Factor of Engines from the Results of Type Trials of Aircraft. By J. D. Coales and A. L. Lingard. October, 1927. Price 6*d.* net. *No.* 1143 (*Ae.* 311).—The Structure of Vortex Sheets. By A. Fage and F. C. Johansen. August, 1927. Price 1*s.* net. H.M. Stationery Office, Kingsway, London, W.C.2.

IV Congresso Internazionale di Navigazione Aerea (Rome, October 24-30, 1927) : 4 *Volumes. Vol.* I. Resoconto. Generale. *Vol. II.* Memorie : Sezione Navigazione Aerea Sezione Turismo e Propganda, Sezione Giuridica. *Vol. III.* Memorie : Sezione Tecnica. *Vol. IV.*—Memorie : Sezione Scientifica ed Aerologica, Sezione Medica. Tipografia del Senato, Rome. Price L.200.

Patent Law and Practice. By A. W. H. Griffiths, B.Sc. Stevens & Sons, Ltd., 119-120, Chancery Lane, W.C.2. Price 7*s.* 6*d.* net.

The Hyderabad Aircraft (*Two Lion Engines*). Air Publication 1318. H.M. Stationery Office, Kingsway, London, W.C.2. Price 2*s.* net.

Dominion of Canada : Report on Civil Aviation and Civil Government Air Operations for the Year 1927. Department of National Defence, Ottawa, Canada. Price 25 cents.

A.B.C. of Flight. By W. L. Le Page. John Wiley and Sons, Inc., New York, and Chapman and Hall, Ltd., Henrietta Street, London, W.C.2. Price 7*s.* 6*d.* (Post free 8*s.*)

The Air Pilot Monthly Supplement. No. 47. *September,* 1928. Air Ministry, Kingsway, London, W.C.2.

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AERONAUTICAL PATENT SPECIFICATIONS

(*Abbreviations* : Cyl. = cylinder ; i.c. = internal combustion ; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

APPLIED FOR IN 1927

Published October 11, 1928

6,731. TELEVISION, LTD., and J. L. BAIRD. Apparatus for vision by invisibls radiation. (297,014.)

16,387. SUPERMARINE AVIATION WORKS, LTD., and R. J. MITCHELL. Load-carrying devices on aircraft. (297,156.)

20,302. G. G. PARNALL and H. BOLAS. Aircraft. (297,192.)

22,150. BLACKBURN AEROPLANE AND MOTOR CO., LTD., and A. H. CRAWSHAW. Pneumatic oleo buffer struts. (297,202.)

30,938. L. AVORIO. Parachutes. (297,242.)

APPLIED FOR IN 1928

Published October 11, 1928

936. M. YOUSSOUPOVNA. Helicopters. (297,268.)

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